Prepared for

BFI Waste Systems of North America, LLC
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Pre-Final Remedial Design Report

MIG/DeWANE LANDFILL SUPERFUND SITE
BOONE COUNTY, BELVIDERE, ILLINOIS
ILD980497788

Prepared by

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Project Number CHE8214

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS

% LEL	Percent Lower Explosive Limit
ARARs	Applicable or Relevant and Appropriate Requirements
BFINA	BFI Waste Systems of North America, LLC
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CH_4	Methane
COC	Chemical of Concern or Contaminant of Concern
CP	Contingency Plan
ESD	Explanation of Significant Differences
FFS	Focused Feasibility Study
GCCS	Gas Collection and Control System
GCL	Geosynthetic Clay Liner
GMZ	Groundwater Management Zone
HRS	Hazardous Ranking Scoring
IAC	Illinois Administrative Code
IDW	Investigation Derived Waste
IEPA	Illinois Environmental Protection Agency
IRM	Interim Remedial Measures
LMS	Leachate Management System
MLTF	MIG/DeWane Landfill Task Force
MNA	Monitored Natural Attenuation
NPL	National Priorities List
OSHA	Occupational Health and Safety Administration
POTW	Publicly Owned Treatment Works
PRP	Potentially Responsible Party
QAPP	Quality Assurance Project Plan
RA	Remedial Action
RCRA	Resource Conservation & Recovery Act
RD	Remedial Design
RDWP	Remedial Design Work Plan
RI	Remedial Investigation
ROD	Record of Decision
ROW	Right-of-Way
SOW	Statement of Work
U.S. EPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

1. INTRODUCTION

1.1 Purpose

This Pre-Final Design Report presents the 95% Remedial Design of the MIG/DeWane Landfill Superfund Site (Site) for review and approval of the Illinois Environmental Protection Agency (IEPA). The IEPA is the lead agency and the U.S. Environmental Protection Agency (U.S. EPA)is the support agency for the Site. This report has been prepared by Geosyntec Consultants (Geosyntec) in accordance with the Remedial Design Work Plan (RDWP) [Geosyntec, 2006] and the IEPA Explantion of Signicant Differences (ESD) for the Site approved in August 2013 on behalf of BFI Waste Systems North America, LLC. (BFINA).

The remedial design and remedial action (RD/RA) is being conducted in accordance with the Remedial Design/Remedial Action Consent Decree [U.S. EPA, 2006] and the IEPA ESD approved in August 2013. Specifically, this Pre-Final Remedial Design Report was prepared in accordance with the requirements of the Statement of Work (SOW) Sections 6.4 and 6.8, contained in Appendix B of the RD/RA Consent Decree (CD) for the Site. As detailed in the August 2013 IEPA ESD, the Modified Remedy includes modifying the landfill cover component of the ROD Remedy. No other changes to the ROD Remedy were made. The landfill cover component of the Modified Remedy consists of improvements to the substantial Interim Remedial Measures (IRM) landfill cover instead of constructing the new landfill cover component of the ROD Remedy. The IRM landfill cover was installed in 1993 in accordance with an U.S. EPA Administrative Order on Consent and an U.S. EPA and IEPA approved scope of work.

The Preliminary Remedial Design Report (PRD Report), comprising at least 30% of the total design, was submitted to IEPA on 25 April 2007. The Preliminary Remedial Design Report was commented on by IEPA on 12 June 2009 and the Geosyntec/BFINA letter response to those comments was submitted to IEPA on 27 July 2009.

This Pre-Final RD Report presents a complete remedial design and incorporates IEPA comments on the PRD Report. This Pre-Final RD Report also includes the table of contents of the Operations & Maintenance (O&M) Plan. The Final Design will address any review comments on this Pre-Final Design submittal, as requested by IEPA and U.S. EPA, and will represent 100% completion of the design including all drawings and specifications ready for bid advertisement.

A Remedial Action Work Plan (RAWP) will be prepared and submitted under a separate cover to the IEPA for approval after submittal of the Pre-Final RD Report. The submittal of the RAWP with the Pre-Final Design is earlier than required by the SOW, which requires the RAWP to be submitted with the Final Design. The RAWP also includes the RA Heath and Safety/ContingecnyPlan (HAS/CP), the RA Construction Quality Assurance (CQA) Plan, and Revision 3 of the Site Quality Assurance Project Plan (QAPP).

1.2 Organization of Report

This Pre-Final Design Report addresses the elements of the RD in the following sections:

Section 1 Introduction

Section 2 Project Information

Section 3 Remedial Design

Section 4 Long-term Operation and Maintenance

Section 5 Other Site Remedial Activities

Section 6 Cleanup Verification Methods

Section 7 Contracting Strategy and Project Schedule

Section 8 References

Tables

Figures

Appendices

1.3 Terms of Reference

This Pre-Final Remedial Design Report was prepared by Brad Bodine, P.E., Omer Bozok, and Val Bosscher, E.I., of Geosyntec. The RDWP was reviewed by John Seymour, P.E., in accordance with Geosyntec's internal quality review process.

2. PROJECT INFORMATION

2.1 Site Background[1]

2.1.1 Site Use

The MIG/DeWane Landfill Site occupies an area of approximately 47 acres located in Boone County, Illinois (see **Figure 2-1**). The Site consists of a Landfill and a leachate surface impoundment. The Landfill rises to a height of approximately 50 to 55 feet above the surrounding terrain and the depth of waste is approximately 10 to 20 feet below the surrounding terrain. The surface impoundment was constructed to receive leachate from the Landfill's gravity flow, leachate collection system. Current Site features are shown on **Figure 2-2**.

The Site is bounded on the north by the Union Pacific Railroad's right-of-way. Agricultural and commercial properties are located to the east and south of the landfill. A soil borrow pit, used in 1992 and 1993 to provide soil for the Landfill's IRM cap, is located immediately adjacent and west of the Landfill. Farther west of the Landfill is the Wycliffe Estates housing development. North of the railroad tracks is an agricultural field that extends to the Kishwaukee River.

The Landfill primarily received residential, municipal, commercial, and industrial wastes for disposal. The Landfill is classified as a Type I landfill based on U.S. EPA guidance. As defined by U.S. EPA, a Type I landfill is a co-disposal facility where hazardous wastes were disposed of with municipal solid wastes. At these types of landfills, discrete "hot spots" are neither known nor suspected to be present. Hot spots consist of highly toxic and/or highly mobile material, and present a potential principal threat to human health and the environment. There are no known or suspected hot spots at the MIG/DeWane Landfill. A Type I landfill also has the presence of hazardous constituents in the groundwater. Hazardous constituents have been detected in groundwater at the Site.

2.1.2 Site History and ESD[1]

The Landfill was operated from 1969 until 1988 when it was closed, and then went into a series of activities under the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), also known as "Superfund", leading up to the present with the conduct of an RD/RA. A timeline of the current and previous Site activities is presented on **Figure 2-3**.

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[1] Section 2.3 of this RD Report provides a listing of reference documents used to present the Site Background. Geosyntec provided an update for activities since the ROD issued in 2000.

The Landfill was permitted to receive residential, municipal, commercial and industrial wastes. With the enactment of the Resource Conservation and Recovery Act (RCRA) regulations in 1980 and 1982, the wastes received by the landfill were later restricted to non-hazardous. The Site activities that led to the current issues at the Landfill include the disposal of various types of wastes and the improper covering of the wastes after disposal in the Landfill.

From at least 1968 to 1983, the Landfill property was owned by Mr. Raymond DeWane and Ms. Jean Farina; and, until his death, Mr. John L. DeWane. In 1983, the property ownership was transferred to a Trust. In 1991, ownership of the property was transferred to L.A.E. Inc., directly. Raymond E. DeWane and Jean A. Farina are the sole L.A.E. shareholders.

From 1969 to 1988, the Landfill site property was leased by various individuals and companies, including: Mr. Jerome Kennedy, Mr. J.D. Mollendorf; Boone Landfill, Inc.; Boone Disposal Co.; Bonus Landfill Co.; Rockford Disposal Service, Inc.; National Disposal Service; Browning-Ferris Industries of Rockford, Inc.; Browning-Ferris Industries of Illinois; and M.I.G. Investments. In that time the property was operated as a landfill by these entities.

Prior to 1969 and until the early 1970s, a gravel pit operated out of the northeastern part of the Landfill, in an area of 5 to 10 acres. A 1966 aerial photograph documents that the northwest and southern portions of the Site consisted of agricultural fields, while the northeast quarter of the landfill contained generally disturbed soil with pockets of excavated soil due to a gravel pit operation. The USGS 7.5 minute series 1970 topographical map of Belvidere North Quadrangle [USGS, 1970] indicates that the northwest and southern portions of the landfill consisted of agricultural fields, while the northeast quarter of the landfill consisted of a gravel pit. The topographical contours suggest that the gravel pit covered approximately 5 to 10 acres with a minimum basal elevation of somewhere between 770 to 780 feet mean sea level ("ft MSL").

In February 1969, the landfill was registered with the State of Illinois and disposal operations began in the gravel pit. The State of Illinois landfill permits required the placement of a 5-foot compacted clay liner across the bottom of the pit, and vertically along the sidewalls. Wastes received were to be disposed of into the clay-lined area, compacted, and covered with soil to form a cell. Each day, the waste in the cell was to be covered by six inches of soil. These and other permit conditions were required in an effort to protect the underlying groundwater from contamination by the waste disposal. Groundwater monitoring wells were installed at various times and locations.

In 1975, a gravitational flow leachate collection system was completed in the area that now comprises the eastern 1/3 of the Landfill. The system allowed landfill leachate to be collected and drained through gravitational flow into a clay-lined leachate collection lagoon or impoundment, measuring approximately 130 feet wide, by 130 feet long, by 10-feet deep and located east of the disposal area.

In 1984, a U.S. EPA contractor conducted an inspection and sampling at the Landfill. This was conducted to provide information for evaluating the Site for Superfund consideration.

In 1985, the State of Illinois filed a complaint against the Landfill operating company, M.I.G. Investments, for violating their landfill operating permit. The complaint alleged that the Landfill operators had violated their permit by allowing the top of the Landfill to exceed, by more than 20 feet, the maximum elevation allowed in the operating permit.

The results of the 1984 sampling were used in the U.S. EPA's November 20, 1986 final report evaluation and Hazardous Ranking Scoring ("HRS") of the landfill. The evaluation, based on the sampling inspection results and Site history, determined that the Landfill leachate was apparently contaminating groundwater, soil, sediments, and noted potential exposure pathways for the contaminants via direct contact, surface water, and groundwater.

In June 1988, a court ordered injunction was issued against M.I.G. Investments for being in violation of the requirements of their landfill operating permit. The injunction required the landfill operators to cease landfill operations. However, the injunction did not affect the need of the owners to meet all the other numerous permit requirements and landfill regulations, such as providing adequate Landfill cover material, nor did it affect any necessary landfill closure requirements. The landfill ceased operations in June 1988. However, the landfill operators abandoned it in July 1988 instead of closing the Landfill as required by the State of Illinois regulations.

In 1989, based upon the 1984 sampling inspection results, the 1986 evaluation and the HRS, the Site was proposed for inclusion on the National Priorities List (NPL). This is a list identifying sites throughout the U.S. that are eligible for study and cleanup, if necessary, under the Superfund program.

On August 30, 1990, the landfill site was placed on the NPL. Further, on October 29, 1990, the U.S. EPA and a previous operator, Browning-Ferris, Inc. ("BFI") entered into an Administrative Order on Consent ("Consent Order") for BFI to properly maintain the leachate surface impoundment by repairing and raising the height of the earthen berms, and reducing the level of leachate waters to insure that they do not overflow the impoundment. In 1990, the earthen berm around the surface impoundment was raised two feet to increase storage capacity.

Also in October 1990, the U.S. EPA began sending Informational Request Letters pursuant to Section 104(e) of CERCLA to potentially responsible parties.

On December 19, 1990, the U.S. EPA sent special notice letters to numerous parties informing them of their potential liability with respect to the MIG/DeWane Landfill Site and offered them the opportunity to perform a Remedial Investigation/Feasibility Study (RI/FS). The responding parties formed a potentially responsible party ("PRP") group called the MIG/DeWane Landfill Task Force" ("MLTF"). These PRPs were the respondents named in the Administrative Order on Consent ("Consent Order") dated March 29, 1991. The Consent Order was signed by the various respondents, the Illinois EPA, and the U.S. EPA. These PRPs agreed to conduct an RI/FS. Additional respondents signed onto the Consent Order at later dates. The dates when additional PRPs signed onto the Consent Order include December 18, 1991, April 28, 1993, and August 2, 1995.

From 1991 through 1993, Interim Remedial Measures ("IRM") were conducted by MLTF. The IRMs included:

- Installation of a Site security fence;
- Removal of visibly stained soils from the intermittent drainage channels in the field located north of the Landfill; and
- Construction of an IRM cap in 1992 and 1993 to promote surface water drainage off of the cover and reduce infiltration. The IRM cap consisted of a grading layer, a 2-feet-thick low permeability layer over the crest of the Landfill, and a 0.5-feet-thick topsoil layer with vegetative grasses over the top and side slopes of the Landfill.

In 1994, sand bags were added along the outside of the surface impoundment earthen berm to improve slope stability after observing a surficial stress fracture in 1993. The stress fracture was monitored for four years during the RI and no additional vertical movement along the stress fracture was observed [Clayton, 1999, FFS, pg 2-3].

RI activities were conducted from 1993 to 1996. During March 1997, the Final Report Human Health and Ecological Risk Assessment (a.k.a. Final "Baseline Risk Assessment") was completed [CDM, 1997]. The final RI Report [Clayton, 1997] was completed in July 1997.

The Focused Feasibility Study ("FFS") was conducted from 1996 through 1999. The Final FFS Report [Clayton, 1999A] was finalized in February 1999.

In March 1999, MLTF installed six gas probes along the western edge of the borrow pit and detected methane in four gas probes. Consequently, a soil-gas extraction system was designed and installed by mid-May 1999 to extract landfill gas from the subsurface. The gas extraction system includes a gravel-filled collection trench that is 1,680-feet-long located along the western perimeter of the landfill with solid vacuum piping and perforated collection piping connected to a blower powered by a 20-HP motor and a utility candle flare. The Site perimeter fence was relocated approximately 125 feet west of the original (1992) location [Clayton, 1999B]. The soil-gas extraction trench has operated essentially continuously from 1999 to the present. The original blower was replaced in July 2003 and in April 2014. Quarterly gas monitoring in gas probes to the west of the Site to assess soil-gas extraction system performance has continued into 2014.

In addition, in April 1999, six extraction wells were installed along the western perimeter of the borrow pit, which is immediately east of the Wycliffe Estates subdivision. Six additional gas probes were also installed in the subdivision west of the borrow pit in May 1999 [Clayton, 1999B]. The six gas extraction wells were connected to the on-site blower using above-ground solid piping. The gas extraction wells operated from May 1999 through 24 January 2000 when IEPA authorized cessation of extraction of gas from the extraction wells.

Further, in response to the identification of methane in gas probes in the Wycliffe Estates subdivision, gas venting and methane monitoring equipment was installed in the basements of a number of homes in spring of 1999 which are still present in the homes as of April 2014.

In March 2000, the U.S. EPA issued a Declaration of the Record of Decision ("ROD") [U.S.EPA, 2000]. The ROD described the process that had been undertaken and the decision that had been selected for the remedy of the Site.

In February and March 2000, MLTF collected groundwater samples for analysis from three monitoring wells and eight gas probes west of the Site, within the area of the Wycliffe Estates subdivision and in borrow pit area. Concurrently, gas samples were obtained from six gas probes in the subdivision area and analyzed.

Addenda to the Baseline Risk Assessment were issued by letters from CDM to U.S. EPA in September and December 1999 [CDM, 1999A & B].

From 2000 through early 2006, U.S. EPA conducted discussions with MLTF and BFINA to implement the ROD. During that time, BFINA and the remaining PRPs came to an agreement that BFINA would take the lead role to implement the ROD. Also during that time, the Site has been maintained by MLTF and BFINA.

On 4 January 2006, the RD/RA Consent Decree was lodged with the U.S. District Court to implement the RD/RA. On 13 March 2006, the Consent Decree [U.S. EPA, 2006] was entered, initiating the conduct of the RD/RA.

On 11 January 2006, BFINA proposed Mr. Eric Ballenger as the Project Coordinator and proposed Mr. John Seymour (Geosyntec) to represent the RD Supervising Contractor. The IEPA approved Geosyntec as the Supervising Contractor in a letter dated 31 March 2006.

The IEPA provided BFINA authorization to proceed with the RD on 28 April 2006.

The RDWP was submitted to IEPA and U.S. EPA on 19 May 2006; the Quality Assurance Project Plan ("QAPP"), an attachment to the RDWP, was submitted to IEPA and U.S EPA on 14 June 2006. The RDWP also included the Pre-Design Investigation Work Plan as a section within the RDWP. Comments were received from IEPA and the RDWP was revised and resubmitted on 1 September 2006 to incorporate IEPA comments. IEPA approved the RDWP on 25 October 2006. The QAPP was revised to reflect the approved IEPA RDWP and submitted to IEPA on 6 November 2006.

Geosyntec, on behalf of BFINA, submitted an Alternative Cover Evaluation Report [Geosyntec, 2006C] on 4 August 2006 that presented a technical equivalency demonstration (TED) in accordance with the SOW and Illinois Administrative Code ("IAC") Part 811. In summary, the TED proposed to substitute a 40-mil thick textured geomembrane with welded seams for the geocomposite clay layer (GCL) specified in the ROD and SOW. Illinois provided comments on the TED and a meeting was held on 17 October 2006 to discuss the comments. The TED was revised and resubmitted to IEPA on 5 January 2007.

Pre-Design Investigation field work was conducted from 13 November through 8 December 2006. A portion of the work could not be completed because the property owner to the north of the Site refused access to conduct required groundwater monitoring and monitoring well inspections. Further, the same owner also refused access to the property to the east of the Site, delaying of a geotechnical investigation on the proposed south borrow area which required access from the property located east of the Site. BFINA spent several months of effort to obtain access from the owner, yet BFINA was unsuccessful and requested assistance from the Illinois Attorney General's office in November 2006. On 12 December 2008 an access agreement was entered into with the property owner and the required groundwater monitoring, monitor well inspections and geotechnical investigation were able to be completed. The Pre-Design Field Investigation Report for November to December 2006 was submitted to IEPA on April 6, 2007.

In a 13 June 2008 letter to Illinois EPA, BFINA proposed to install the gas wells and vents in 2008 and outlined a plan for their installation. The Illinois EPA provided comments on the plan on 26 June 2008 and BFINA responded on 16 July 2008. The plan was approved in a letter dated 3 November 2008 and construction was allowed to commence. The goal of this project was to create additional gas venting over the existing soil cover to contain and remediate gasses generated from the Site. The intent of constructing the wells and vents in 2008 was to: (i) expedite venting of landfill gas to mitigate the presence of methane in gas probes (GP) GP-27, GP-28 and GP-30; and (ii) shorten the construction schedule for the remaining RA construction work. The Completion Report for Gas Vent and Gas Well Remedial Construction was submitted to IEPA on February 8, 2010.

Geosyntec, on behalf of BFINA, has conducted quarterly landfill gas monitoring since 2008 in accordance with the IEPA-approved Interim Landfill Gas Monitoring Program. Geosyntec, on behalf of BFINA, has conducted semi-annual groundwater sampling since 2010 in accordance with the proposed Interim Groundwater Monitoring Program which IEPA gave approval to commence.

On June 5, 2012, Geosyntec, on behalf of BFINA, submitted a technical memorandum providing technical support for a proposed modified remedy for the Site. The Modified Remedy was proposed for the Site based on new and significant information collected since the ROD was issued. Significant additional IRM landfill cover thickness measurement data, leachate level measurement data, and groundwater quality data demonstrate that the IRM landfill cover system has achieved an effectiveness that is substantially equivalent to that predicted for the ROD Remedy landfill cover component. In August 2013, IEPA and U.S. EPA approved the modified remedy, consisting of improvements to the existing IRM landfill cover documented in the IEPA ESD dated July 2013 and signed in August 2013. All other portions of the remedy remain the same as described in Sections 2 and 3 of the SOW.

2.2 Site Description

The Site, also known as Boone Landfill, M.I.G. Investments, DeWane Landfill, Bonus Landfill, or Kennedy Landfill, is located in Boone County, Illinois approximately 0.25 miles east of the City of Belvidere and 0.5 miles north of U.S Business Route 20 (**Figure 2-1**). The Site is located primarily in the south half of the southeastern quarter of Section 30, Township 44 North, Range 4 East. The Site is bounded on the north by the Union Pacific Railroad tracks. North of the railroad tracks is an agricultural field that extends to the Kishwaukee River.

Agricultural property is located east of the Site and commercial properties are located to the south of the Site. A soil borrow pit, used to provide soil for the Site's interim cap, is immediately adjacent to and west of the Site. Farther west of the Site is a residential housing development known as the Wycliffe Estates subdivision. Southwest of the Site is a residential development which began construction in February 2007.

The Site occupies an area of approximately 47 acres and rises to a height of approximately 55 feet above the surrounding terrain (**Figure 2-1**). The Design Drawings present a detailed plan of Site features and property ownership (Property Identification Numbers) as of April 2014 (see **Appendix A**). The Site consists of a landfill and leachate surface impoundment. The surface impoundment was constructed to receive leachate from the eastern area of landfill operations through a gravity flow leachate collection system.

A landfill gas extraction system, composed of two vents for passive gas removal, had been installed on the crest of the Site prior to the Site being abandoned in 1988 by M.I.G. Investments, Inc. To the east of the Landfill, abandoned gas extraction equipment is located within a fenced enclosure.

The cover was upgraded in 1993 under an IRM, to include the addition of compacted clay soil over the top of the Landfill to remove depressions, topsoil and seeding over the entire landfill cap.

A gas extraction system, consisting of a collection trench located west of the Landfill, six extraction wells located east of the Wycliffe Estates subdivision, and a blower and utility flare, were installed in 1999. The gas extraction system west of the Site has been used to collect gas that had migrated from the Landfill to the area of Wycliffe Estates. The western gas extraction system has operated essentially continuously into 2014. The six extraction wells located east of Wycliffe Estates were decommissioned with IEPA approval in October 2009, following demonstration that methane concentrations were consistently below action levels

In 2008, seventeen (17) dual phase (landfill gas and leachate) extraction wells and forty one (41) passive landfill gas vents were installed on the top and side slopes of the landfill in order to expedite venting of landfill gas. Each of the dual phase extraction wells and passive landfill gas vents were installed with wind-activated turbine vents on the tops. Construction details are provided in the Completion Report for Gas Vent and Gas Well Remedial Construction, dated 28 January 2010.

2.3 Reference Documents

The following reference documents were used to develop the Site Description and Site History up to April 2014:

- Interim Remedial Measures Construction Completion Report [Golder, 1993].
- Remedial Investigation Report [Clayton, 1997]. Submitted 11 July 1997, this document characterizes the MIG/DeWane Landfill site study area based on the data collection and

evaluation and results obtained during the Remedial Investigation and the Baseline Risk Assessment. The remedial action objectives are identified for the MIG/DeWane Landfill that include risk mitigation, impact minimization of the precipitation runoff and leachate migration, human health risk evaluation of future land development, and overall compliance with applicable groundwater requirements.

- Final Focused Feasibility Study – Clayton Environmental Services [Clayton 1999a]. Submitted on 1 February 1999, this study evaluates the potential remedial action alternatives developed for the MIG/DeWane Landfill site to mitigate associated human health and environmental risks identified in the Remedial Investigation Report and the Baseline Risk Assessment.
- Gas Extraction System Construction Report– [Clayton 1999b]. Submitted 28 July 1999, this report documents the design and installation of the soil-gas extraction system and provides a summary of the operational parameters. Construction of the system was initiated on 23 April 1999 with active operation of the gas extraction system starting on 13 May 1999.
- Groundwater/Soil-Gas Monitoring Report – [Clayton, 2000]. Submitted 14 July 2000, this report documents the results of additional groundwater and soil/gas air samples necessary to prepare the Addendum to the Human Health section of the Baseline Risk Assessment.
- Record of Decision [U.S. EPA 2000].
- RD/RA Consent Decree and the attached SOW [IEPA, 2006]. This document provides the requirements of the RD/RA.
- Preliminary Design Report. [Geosyntec, April 25, 2007].
- Pre-Design Field Investigation Report for November to December 2006. [Geosyntec, April 6, 2007].
- Completion Report for Gas Vent and Gas Well Remedial Construction [Geosyntec, February 8, 2010].
- Technical Memorandum – Modified Remedy [Geosyntec, June 2012].
- IEPA Explanation of Significant Difference [IEPA, July 2013].

3. REMEDIAL DESIGN

3.1 Institutional Controls

3.1.1 Overview

This section provides a description of the institutional controls required by the CD, including the ROD and SOW. Institutional controls, including legal mechanisms such as easements, covenants, well drilling prohibitions, zoning restrictions and adherence to local ordinances limiting groundwater use, will be implemented to protect human health and the environment from site hazards such as contaminated groundwater, leachate, and landfill gas and remedial control systems.

In summary, institutional controls are required regarding:

- Site security including perimeter warning signs;
- Property use restrictions for the Site (the Landfill property and portions of the property to the south of the Landfill); and
- Controls of the groundwater use in the areas required to establish the groundwater management zone (GMZ).

3.1.2 Design Criteria and ARARs

Site Security

The following ARARs are related to site security:

- A 6-foot-high chain link fence around the site perimeter (page 8 of SOW) is required and in place.
- Warning signs have been posted at 200-foot intervals along the fence and at all gates.
- Applicable portions of IAC Title 35, Subtitle F, Part 811.109 "Boundary Control" must be met.

Under IAC Title 35, Subtitle F, Part 811.109 a) "Boundary Control", the following is required:

> *"Access to the open face area of the unit and all other areas within the boundaries of the facility shall be restricted to prevent unauthorized entry at all times."*

Further, applicable portions of Part 811.109 b) require:

b) A permanent sign shall be posted at the entrance to the facility stating that disposal of hazardous waste is prohibited and, if the landfill is approved for accepting special wastes, that special wastes must be permitted by the Agency and accompanied by a manifest and an identification record along with the following information:

3) The penalty for unauthorized trespassing and dumping;

4) The name and telephone number of the appropriate emergency response agencies who shall be available to deal with emergencies and other problems, if different that the operator; and

5) The name, address and telephone number of the company operating the facility."

Property Restrictions

Property restrictions are specified on pages 8 and 9 of the SOW. In summary, they include zoning restrictions, deed restrictions/restricted covenants, and adherence to local ordinance restriction groundwater use to restrict access to the Site, especially the contaminated groundwater, leachate, and landfill gas and remedial control systems. Deed restrictions shall be prepared and recorded against the Site and the adjacent western soil borrow pit portion of the Site.

Establishment of a Groundwater Management Zone

The areas to the north, northwest and west of the Site will be designated as a GMZ and shall meet the requirements of 35 IAC, Subtitle F, Part 620.250, 505, 510 and Part 740.530. The specific areas included in the GMZ based on the FFS [Clayton, 1999]are shown on **Figure 3-1.**

Establishment of GMZ is further discussed in Section 3.6 of this RD Report.

3.1.3 Description of the Remedy

Site Security

A fence presently exists at the Site to prevent access and vandalism and trespass in accordance with the CD (see **Appendix A**). Fencing consists of a chain-link fence around the perimeter which is a minimum of six-foot high with a minimum of three-strands of barbed wire. This fence shall be required to be maintained during the RA by the RA Contractor. Temporary substitutions may be made with the approval of BFINA or its designated representative.

Warning signs have been installed that look like the following graphic:

WARNING
HAZARDOUS
MATERIALS

AUTHORIZED
PERSONNEL
ONLY

CALL 1 (800) 782-7860
FOR EMERGENCY

MIG/DeWANE
LANDFILL SITE

The signs have been installed at approximately 200-foot intervals on the perimeter security fence and on the gate. The language and phone number on the signs were established after discussion with the IEPA Project Manager.

To meet Part 811.109.a, the Specifications (located in **Appendix B**) address access restrictions for the construction phase and post closure. Access will be restricted by the Supervising Contractor and/or the RA Contractor.

A sign with the information required by Part 811.109.b is required in the Specifications to be installed at the gate by the RA Contractor (**Appendix B**).

Property Restrictions

In accordance with the SOW, BFINA executed and recorded with the Boone County recorder the required restrictive covenant/deed restrictions for the properties identified in Appendix I of the CD within 15 days after the entry of the Consent Decree. The use restriction agreement was established in 1999 in accordance with Appendix I of the CD.

Groundwater Management Zone

The GMZ Plan designates the controls and procedures necessary to control groundwater use and exposure within the GMZ, the immediate and long-term remediation objectives for the groundwater contamination areas, and required data acquisition (monitoring). The GMZ Plan is described in detail in Section 3.6 of this RD.

The GMZ Plan also outlines the necessary procedures and controls required for remediation of the area by monitored natural attenuation ("MNA"). The successful management of this remediation zone is an important institutional control to be maintained throughout the entire groundwater management zone until the groundwater remedial objectives are attained.

The GMZ remedy will be periodically reviewed by the IEPA to determine the on-going adequacy at the Site. Once the Contaminants of Concern (COCs) have met remedial objectives, either a No Further Remediation Letter will be issued by IEPA or the agreement to maintain the GMZ will be terminated upon IEPA receipt of appropriate completion documentation which confirms the completion of the action taken pursuant to 35 IAC Subtitle F, Chapter 1, Part 620.250.

3.2 Leachate Management System

3.2.1 Overview

The Leachate Management System ("LMS") for the Site includes mechanisms for drainage of leachate from beneath the improved IRM cover system and contingency measures that may be implemented should groundwater contamination exceed predefined action levels. The groundwater action levels have been established based upon calculated concentrations of COCs in groundwater such that nearby surface water criteria are not exceeded in the Kishwaukee River.

In general, the control of leachate seeps will include passive drainage systems under the improved IRM cover that will gravity drain leachate to two underground storage tanks located at southeast and northwest corners of the Landfill. Leachate from the underground tanks will be pumped to an above ground central storage tank that will be located near the south entrance, inside the fenced portion of the Site. All leachate is anticapted to be transfered from the central storage tank into tanker trucks and transported to the Rock River Water Reclamation Disctrict (RRWRD) for treatment. Based on discussions with the RRWRD it is anticipated that the a permit will be approved to discharge the leachate to the RRWRD POTW without pretreatment. A permit application to discharge leachate to the RRWRD is being prepared and will be submitted at least 45 days prior to disposal. Treatment and disposal by a commercial waste treatment and disposal facility (Advanced Waste Systems) is the contingency option for leachate disposal.

Should active leachate removal be required based on post-construction operation and maintenance groundwater monitoring data, the 17 existing dual phase gas extraction wells/vents (see Section 3.3) that have well screens that extend below the leachate level will be utilized to extract leachate. Prior to initiation of active leachate removal from the extraction wells, leachate management and disposal options will be reassessed, designed, and implemented as necessary.

3.2.2 Pre-Design Investigation and Additional Information

A Pre-Design Investigation was conducted in 2006 to assess the leachate elevations, leachate quality, potential generation rates, and potential causes for seeps at the Site. Summary tables of the results of the Pre-Design Investigation and more recent additional relevant information are presented in **Appendix C**. Further details of the investigation are provided in the Pre-Design Field Investigation Report [Geosyntec, 2007b].

Significant additional information was collected at the Site after the conclusion of the Pre-Design Investigation, including groundwater monitoring data, leachate elevation data and IRM cover thickness data. A summary of the significant additional information is included in the Modified Remedy Technical Memorandum document which was the basis for the ESD for the Site [Geosyntec, 2012].

The Pre-Design Investigation and additional information provided the following information regarding the Landfill leachate and Site conditions:

- During the Pre-Design Investigation leachate was generally at an elevation of 815 to 820 ft MSL in the crest area of the Landfill, and from elevation 790 to 805 ft MSL near seeps along the perimeter of the Landfill.
    - Additional leachate level measurements were obtained in 2008 during construction of dual phase and passive gas vents. Based on these measurements, leachate level ranged from approximate elevation 793 feet (at DP-09) to 823 feet (at GV-30) at the crest of the Landfill, and ranged from approximate elevation 791 ft (at GV-41) to 811 feet (at GV-05) along the side slope (see **Table 3-1**).
- The locations surface leachate seeps were mapped by Geosyntec in July 2012.
- The hydraulic conductivity of the waste containing leachate at the leachate piezometers is approximately 4×10^{-3} to 5×10^{-4} cm/sec.
- The leachate is not hazardous based on concentrations of constituents from the four leachate piezometers **(Table 3-2)**.

- The leachate characteristics meet POTW criteria found in Title 2 of the RRWRD Code of Ordinances, and based on discussions with the RRWRD it is anticipated that the a permit will be approved to discharge the leachate to the RRWRD POTW without pretreatment (**Table 3-3**). A permit application to discharge leachate to the RRWRD is being prepared and will be submitted at least 45 days prior to disposal.
- The LMS will require storage tanks to contain leachate from northern, western and eastern sides of the Landfill.

Groundwater quality results from 2010 through 2014 at monitoring wells north and west of the Landfill indicate target volatile organic compounds (VOCs) are significantly below the groundwater quality action levels for the North Interface Pathway and West Interface Pathway (**Tables 3-4** and **3-5**). The groundwater has improved so much since the RI that during the 2010, 2011, 2012, and 2013 groundwater monitoring events, there has been only one VOC (benzene) above its Maximum Contaminant Level (MCL) or Illinois Class I Groundwater Standards (ICIGS) at MW06S, and no VOCs have been detected above MCLs or ICIGSs at any other location (**Table 3-4**). The groundwater improvement in these data indicates that natural attenuation has been effective in reducing COC concentrations in groundwater at the Site.

By comparison, the following summarizes the groundwater conditions characterized during the RI:

A comparison of the recent groundwater analytical data to the RI data (from 1993, 1994 and 1995) is depicted on **Figure 3-2** and is summarized below:

During the RI in 1995, benzene was detected at concentrations greater than the MCL/ICGS of 5 µg/L at three (3) groundwater monitoring well locations (MW06S, MW13, and MW15) at concentrations ranging between 6 µg/L and 12 µg/L. Benzene was not detected at concentrations greater than the MCL/ICGS except at one (1) groundwater monitoring location (MW06S) during the April and December 2010 and December 2011 groundwater monitoring events when benzene was detected a concentrations of 7.6, 7.7, and 7.6 µg/L, respectively.

During the RI, DCE was detected at one (1) groundwater monitoring well location at a concentration greater than the MCL/ICGS of 7 µg/L (MW02D, 1993, 15 µg/L). DCE was not detected at any groundwater monitoring well location during the April and December 2010 and December 2011 groundwater monitoring events.

During the RI, DCP was detected at two (2) groundwater monitoring well locations at concentrations greater than the MCL/ICGS 5 µg/L (MW14, 1995, 10 µg/L and MW16, 1995, 6 µg/L). DCP was not detected at any groundwater monitoring well location during the April and December 2010 and December 2011 groundwater monitoring events.

During the RI, PCE was detected at two (2) groundwater monitoring well locations at concentrations greater than the MCL/ICGS of 5 µg/L (MW02S, 1993, 6 µg/L and MW14, 1995, 7 µg/L). PCE was not detected at any groundwater monitoring well location during the April and December 2010 and December 2011 groundwater monitoring events.

During the RI, TCE was detected at two (2) groundwater monitoring well locations at concentrations greater than the MCL/ICGS of 5 µg/L (MW14, 1995, 7 and 10 µg/L and MW15, 1995, 6 µg/L). TCE was not detected at any groundwater monitoring well location during the April and December 2010 and December 2011 groundwater monitoring events.

During the RI in 1995, VC was detected at concentrations greater than the MCL/ICGS of 2 µg/L at five (5) groundwater monitoring well locations (MW03S, MW13, MW14, MW15, and MW16) at concentrations ranging between 3 µg/L (MW16) and 28 µg/L (MW15). Since 1995, VC has been detected at a concentration greater than the MCL/ICGS one time at one (1) groundwater monitoring well location (MW03S, 2000, 6 µg/L). VC was not detected at any groundwater monitoring well location during the April and December 2010 and December 2011 groundwater monitoring events.

Based on groundwater concentrations of COCs which are well below the action levels and that natural attenuation at the Site appears to be effective, an active leachate extraction system is not anticipated to be necessary to address groundwater impacts.

3.2.3 Design Criteria & ARARs

This section provides the requirements of the CD, design criteria developed in the RD, and presents ARARs for the LMS. A detailed description of the remedy is provided in Section 3.2.5.

The overall design objectives of the LMS are to:

- Reduce hydrostatic pressures that could accumulate under the improved IRM cover system to avoid the potential for seepage to be discharged from under the perimeter of the improved IRM cover system and migrate to nearby soils and surface water; and

- Reduce the quantity of leachate migration to groundwater if predefined action levels (groundwater contaminant concentrations) are exceeded.

The SOW requires that the LMS include the originallyinstalled gravity controlled system with a collection tank to replace the surface impoundment, and a system of either permeable bed layers or side slope drainage trenches, with the potential for contingent leachate removal upgrade options.

The SOW also requires the LMS to be constructed of passive collection trenches or permeable bed layers in the areas of major leachate seeps. Based on the leachate levels from the Pre-Design Investigation and from 2008, well as the July 2012 observations (Section 3.2.2), it has been concluded that the LMS can passively collect leachate to eliminate leachate surface seepage. As an added benefit the passive collection of leachate seepage will also reduce leachate migration to groundwater within the Site by reducing the hydrostatic pressure of leachate in the Landfill.

The LMS will meet the relevant and appropriate requirements of 35 IAC Part 811.308.

Groundwater quality will be the principal mechanism that will be used during post-construction, long-term monitoring to initiate an assessment of whether active leachate removal is required. **Table 3-4** presents the target surface water quality and groundwater action levels established in the ROD. Leachate levels and characteristics will also be monitored as part of the long-term opertation and maintenance of the Landfill.

If the concentration of any of the groundwater quality COCs meet or exceed the action levels for two quarterly groundwater sampling events within any four consecutive quarters, and if it is concluded that the occurrences are due to leachate from the Landfill, then the exceedance will trigger the contingency leachate removal process that requires the implementation of the alternative remediation measures (ROD page 62). After the RA construction is completed, an assessment or review of the RA will be completed every five years, in the form of a Five Year Review, and the need for active leachate removal will be assessed. At this time, the RD Report will not contain the design of the alternative remediation measures because the design will be dependant upon many factors, including the specific post-closure monitoring results and response of the Landfill to improved IRM cover construction.

However, if leachate must be removed in a shorter time frame than can be achieved by gravity operation of the trench collection system to mitigate the impact of present and/or future seeps, active interior leachate extraction must be implemented as a contingent remedial action measure to address groundwater contamination, surface water regulations or other ARARs. To help meet this contingency, 17 dual phase extraction wells were installed in 2008, which are currently functioning as gas vents (see Section 3.3), and can be operated as leachate extraction wells in the future. If additional leachate controls are required beyond the 17 dual phase extraction wells, passive horizontal wells or additional active vertical extraction wells will be installed in areas where there is a need based on the internal hydrostatic pressure measurements and engineering determinations. These determinations will be made during the post-closure period as a part of the Five Year Review process required by CERCLA and the CD.

All leachate collected at the site will be treated at the RRWRD POTW or other approved POTW or disposal facility. Leachate testing conducted during the Pre-Design Investigation and groundwater monitoring has indicated that hazardous constituents are present but not at concentrations high enough to indicate the leachate is a characteristic hazardous waste. A summary of leachate test results are presented in **Appendix C-5**. Because the leachate is not a characteristic hazardous waste and is not a specific listed hazardous waste, off-Site transportation does not have to meet hazardous waste hauling requirements. However, for off-Site transportation and disposal, the waste is considered a "Special Waste" under Title 35 IAC Part 808 and will be manifested in accordance with the rules and transported using a licensed hauler, who will also be permitted by RRWRD.

Leachate storage tanks are required to store leachate in accordance with the requirements of IAC Title 35, Part 811.309. The tanks are sized to hold an estimated a minimum of five days of generated leachate at the maximum design generation rate. For the Site, the tanks that are designed to be entirely below ground avoid freezing of liquids and equipment. The below ground tanks have secondary containment in the form of a double-wall tank. The above ground leachate tank will be heated with immersion heaters. The above ground tank will also have secondary containment in the form of concrete floors and perimeter walls.

All liquids and a minimum of two feet of sediments will be removed from the surface impoundment east of the Landfill in accordance with the ROD. The liquids will be treated and disposed of in an approved manner. The sediments will be disposed of in the Landfill below the improved IRM cover system or in an otherwise approved manner. If after removal of a minimum of two feet of sediments there are additionnal soft/saturated or visibly contaminated sediments, they will also be removed and disposed of in the Landfill. Following the removal of soil and sediments from the bottom of the surface impoundment, discrete soil samples will be collected from the bottom of the empty surface impoundment to confirm the extent of impacted soil and sediment has been removed. The empty surface impoundment will then be filled with clean soil and graded as necessary to avoid ponding.

3.2.4 Analysis

Analyses were completed to design the LMS. The following provides a summary of the results of each analysis. Further details are included in the calculation packages included in **Appendix D**.

Leachate Generation

The following were analyzed to estimate the leachate generation rate and total quantity to meet design criterion of avoiding seepage from hydrostatic pressure underneath the improved IRM cover system:

- The total quantity of leachate that would be drained to permanently reduce leachate levels after construction of IRM cover improvements such that no significant leachate collection will be required

Given the location of seeps and the consequent plan layout of the interceptor trenches, the collection pipes will need to be located approximately four to five feet below the cover and at least one foot below the elevation of the nearest seep. The maximum leachate generation rate which is expected to occur after the installation of the leachte collection trenches was calculated to be 4,500 gal/day to the northwest corner of the Landfill and 2,000 gal/day along the eastern perimeter of the Landfill (**Appendix D**). Leachate generation rates are anticipated to decrease after an initial flush of leachate into the newly constructed interceptor trenches.

The U.S. EPA conducted research regarding the leachate generation rate at a number of MSW landfills for the post-closure period [Bonaparte, et al 2002]. Although Bonaparte et al., (2002) indicates the data used to determine the decrease in leachate generated is from modern landfills with a geomembrane or composite landfill cover, a smiliar decrease may be observed at the MIG/DeWane Landfill.

A similar decrease in leachate generation rates may occur because the MIG/Dewane Landfill has been closed and covered for approximately 19 years, with a thick (as much as 19 feet thick) compacted clay liner for the Landfill cover. Additionally, the existing leachate surface impoundment east of the landfill previously collected leachate from the Landfill's leachate collection system, but is now essentially dry. A significant reduction in leachate levels within the landfill has been observed by measuring leachate levels in 58 gas vents/wells on the landfill surface. An additional leachate collection system is planned for the Landfill, which will further reduce the leachate levels within the Landfill. It is this "initial flush" of leachate from the planned leachate collection system that is expected to reduce over time.

This information was evaluated for the RD to estimate the amount of time that could elapse until essentially no leachate (~1 percent of the original flow) would be generated other than stormwater infiltrating through the cover system. The analysis is summarized on **Figure 3-3** and indicates that the leachate generation rate will decline to 2,100 gal/day approximately 8 years after cover improvments is completed. Approximately 2 percent of this amount is the leachate that is present by the time cover construction is completed and the remaining amount is the leachate due to stormwater infiltration over the previous year. Further details are included in **Appendix D**. The estimated total quantity of leachate that will be generated over 8 years following post closure period is approximately 10,800,000 gallons.

Disposal of Leachate

The results of leachate chemical analyses indicate that the leachate meets the RRWRD discharge limitations criteria found in Title 2 of the RRWRD Code of Ordinances. A summary table of leachate testing data is presented in **Tables 3-2** and **3-3**. Based on discussions with the RRWRD it is anticipated that a permit will be approved to discharge the leachate to the RRWRD POTW without pretreatment. A permit to discharge leachate to the RRWRD is in the process of formally being applied for. The leachate will be hauled by tanker truck to the RRWRD POTW.

The leachate analyses indicate that the leachate also met all criteria for treatment/disposal by a commercial waste treatment and disposal facility (Advanced Waste Systems). Treatment and disposal by a commercial waste treatment and disposal facility (Advanced Waste Systems) is the contingency option for leachate disposal. The leachate would be hauled by tanker truck to the disposal facility.

Construction Quality Assurance

The LMS shall be constructed and monitored under a construction quality assurance (CQA) plan in accordance with 35 IAC Part 811 Subpart E.

3.2.5 Description of the Remedy

This section presents a description of the LMS. The LMS Design Drawings are presented in **Appendix A** and the Specifications are located in **Appendix B**. The list of specifications for the RA is presented in **Table 3-6** and a list of Design Drawings is presented on **Table 3-7**. The leachate remedy is composed of the following features:

- Interceptor trenches located along the portions of the north, east and south perimeters of the Landfill as shown on the Design Drawings in **Appendix A**, installed using a one-pass drainage pipe installation method;

- Existing dual phase extraction wells that can be used for active leachate extraction in the future if the groundwater action levels are exceeded (see **Appendix A**);

- Dual containment leachate accumulation tanks on the southeastern and northwestern areas of the Site (see **Appendix A**); and

- Leachate disposal via hauling and discharge to the RRWRD POTW.

The interceptor trenches have been designed to intercept leachate and gravity drain to two separate underground storage tanks located at northwestern and southeastern corners of the site.

Leachate will be pumped from these underground storage tanks to an above ground central storage tank to prevent seepage outside of the improved IRM new cover system resulting in potential leachate exposure.

The interceptor trenches are composed of relatively shallow (4 to 5 feet below existing grade) trenches with high density polyethylene (HDPE) perforated pipe placed near the bottom of the trench. The trenches are to be backfilled with washed gravel as shown on the Design Drawings in **Appendix A**. The HDPE pipe is designed to be sloped at a minimum of 0.5% toward the edge of the Landfill to be stored in underground storage tanks. Gravel backfill will be resistant to leachate and will be non-calcerous aggregate. A geotextile filter fabric will be placed between the waste in the trench wall and gravel backfill to filter out waste particles and sediment to help maintain leachate drainage in the gravel and collection pipe.

Where collection piping is located outside of the cover system, it will be solid, double wall HDPE piping.

In addition, as the leachate collection trenches are installed, impacted soils from each nearby seep location will be removed to a minimum of three feet and placed in the Landfill under the cover. The void will be backfilled with low permeability compacted clay (Clay Fill) and a Vegetative Layer and revegetated.

3.3 Landfill Gas Collection and Control System

3.3.1 Overview

The Gas Collection and Control System ("GCCS") for the Site includes mechanisms for passive venting of landfill gas from beneath the improved IRM cover system and contingency measures that can be implemented should methane concentrations exceed 35 IAC Part 811.311 criteria. The ROD does not require landfill gas (LFG) treatment or destruction (e.g. flaring) prior to discharge from vents on the Landfill.

The ROD contemplated active measures based on the FFS. Concurrent with finalizing the ROD in 1999 and 2000, it was identified that methane was present above Part 811 criteria west of the Site and an active soil-gas extraction system, consisting of a collection trench along the western Site perimeter, six (6) extraction wells located east of the Wycliffe Estates subdivision, and a blower and utility flare, were installed in 1999, as detailed in the Clayton Environmental Consultants Gas Extraction System Construction Completion Report, dated July 1999. The six IRM gas extraction wells were operated from May 1999 through 24 January 2000 when IEPA authorized cessation of extraction of gas from the six extraction wells following demonstration that methane concentrations were consistently below action levels.

In 2008, seventeen (17) dual phase (landfill gas and leachate) extraction wells and forty-one (41) passive landfill gas vents were installed, as part of the Remedial Action, on the top and side slopes of the landfill in order to expedite venting of landfill gas. Each of the dual phase extraction wells and passive landfill gas vents was installed with wind-activated turbine vents [Geosyntec, 2010].

The existing soil-gas extraction system, consisting of on-going active gas extraction from the collection trench along the western Site perimeter as well as continued passive gas extraction at the dual phase extraction wells and passive landfill gas vents, has been factored into the RD.

Should additional active landfill gas removal be required based on gas monitoring data, the landfill gas vents installed in 2008 were designed with a sufficient diameter and with screens extending from below the cover system down to the leachate level such that the gas vent wells may be retrofitted with a vacuum system to extract gas. However, the design of piping and equipment for an active gas extraction system is not provided in this RD Report and would be completed should it become necessary during the post-closure period.

3.3.2 Gas Monitoring Results- Pre-Design Investigation and Historical

A Pre-Design Investigation was conducted in late 2006 and early 2007 to assess the presence and concentrations of LFG, primarily methane, in borings through the cover ("cover borings"), existing landfill gas probes through the cover, and in eight new gas probe borings outside the limit of waste around the perimeter of the Landfill. In addition, there has been over 14 years of gas monitoring data collected in gas probes and the gas extraction trench west of the Site from 2000 to 2014. The condition of the existing GCCS equipment was also evaluated for incorporation into the new GCCS.

The Pre-Design Investigation and historical gas monitoring results indicate the following findings:

- Methane was found at the top of all 24 cover borings and 4 leachate piezometer borings that penetrated the cover and in the waste at concentrations of 0.1 to 8.0%. In addition, methane has been detected in the passive gas vents and dual phase wells (currently operating as gas vents), which penetrate the cover and into the waste, at concentrations up to 73% (**Table 3-8**), indicating methane is prevalent under the cover.
- Methane (CH_4) has been found above the Part 811.314 criterion (CH_4 >50% LEL in the subsurface outside the Landfill) in GP-26, GP-27, GP-28 and GP-30, located in and/or outside of the eastern 1/3 of the Landfill (**Table 3-9A**). In 2011, additional Site perimeter gas probes were installed to monitor conditions at the Site perimeter: GP-34 and GP-35

(to the south of GP-30) and GP-36 and GP-37 (to the east of GP-28). Adjacent to the area of GP-27 off Site is an AT&T buried fiber optic cable in the railroad right of way; AT&T has been notified that methane has been detected in GP-27 above the LEL.

- Methane was detected above the Part 811.314 criterion (CH_4 >50% LEL in the subsurface outside the Landfill) in MW-13 in 2001 (when the gas extraction system was down for repairs) and during five events in 2009 through 2014.

- Methane monitoring results have been below the Part 811.314 criterion (CH_4 >50% LEL in the subsurface outside the Landfill) in gas probes at the Site perimeter during the last two years of quarterly monitoring events (since February 2012), with the exception of three events at GP-26.

- The active (western collection trench and extraction wells) and passive components of the GCCS have been implemented to address elevated detections of methane in the Landfill and in the areas of MW-13, GP-26, GP-27, GP-28, and GP-30 adjacent to the Landfill (**Table 3-9A**). The active gas extraction via the extraction wells along the eastern edge of the Wycliffe Estates (west of the Landfill and borrow pit area) was discontinued in 2009 after IEPA approval (and approximately 8 years of non-detectable methane concentration in the extraction wells during quarterly gas monitoring).

- The monitoring results from gas probes to the west of the extraction trench and from the riser columns indicate the extraction trench has removed methane from the subsurface west of the extraction trench to non-detect levels and appears to be drawing methane out of the Landfill and combining it with clean subsurface vapor yielding relatively low (4%) methane readings in the extraction trench and blower.

    - Methane was not detected above 50% of the LEL in the southwest portion of the Site between the existing gas extraction trench and Wycliffe Estates (see GP-31, GP-32 and GP-33 in **Table 3-9A**), with the exception of one detection (3.2% methane) at GP-31 in March 2014 that was below the LEL of 5% methane. The blower was found to not be functioning properly in March 2014, and is being replaced in April 2014. As discussed below, however, methane concentrations in soil gas to the west of the Site perimeter were at or below background levels in March 2014 (**Tables 3-9B and 3-9C**).

    - Methane has been generally detected at concentrations ranging from 2% to 6.5% in riser columns RC-2 through RC-5 in the gas extraction trench immediately west of the Landfill from January 2005 through 2014 (**Table 3-10**). Elevated detections of methane at RC-3 and RC-4 in March 2014 are attributed to the blower not operating properly.

- Methane has been generally at or below the 0.1% detection limit at RC-1, located at the southern-most end of the gas extraction trench, and methane was not detected in the three gas probes in that area, indicating that methane does not appear to be present above the detection limit to the southwest of the Landfill **(Table 3-10)**.
- Methane concentrations at the blower have typically been measured to be less than 4% for the past four years **(Table 3-10)**. Elevated detections of methane at the blower in March 2014 are attributed to the blower not operating properly.

- All blower equipment for the existing active components of the GCCS is functioning, and the existing passive gas vents in the cover system GCCS are operating as designed. Although the flare is not currently in use, due to low concentrations of methane at the blower, the flare may be activated if elevated concentrations of methane become present at the blower. The expected lifetime of the blower is approximately 8-10 years based on the lifetime of previous blowers at the Landfill. The current blower will be replaced in April 2014.
- Methane has not been detected above the detection limit or background concentration in any of the monitored gas probes (GP-10 through GP-15 and MW-14) in the borrow pit west of the Site since 2001 **(Table 3-9B)**, with the exception of one detection of 3.1% methane at GP-11 in January 2013. Methane concentrations have not been detected above the detection limit or background concentration at GP-11 during subsequent monitoring in 2013 and 2014.
- Methane has not been detected above the detection limit or background concentration in any gas probes in the Wycliffe Subdivision west of the Site since March 2000, with the exception of one detection of 1.3% methane at GP-21 in May 2008 **(Table 3-9C)**. Methane concentrations have not been detected above the detection limit or background concentration at GP-21 during subsequent monitoring since 2008.

3.3.3 Design Criteria & ARARs

The design criteria summarized in this section are based upon the requirements of the SOW and additional engineering principles. In general, the landfill gas management program is required to have a GCCS with both passive and active components, and long-term gas monitoring to control landfill gas at the Site. The existing GCCS, including RA components installed in 2008, meet appropriate portions of 35 IAC Part 811.314, as summarized in this RD Report.

The GCCS is to be designed to control and vent existing landfill gas. As a part of the design of the overlying cover system, the GCCS was designed and implemented to avoid gas pressure build up that could cause instability of the cover or uncontrolled release of methane outside the limits of the Landfill in excess of 35 IAC Part 811.314 criteria.

The majority of the GCCS has been installed with active and passive components:

- An active soil-gas extraction system, consisting of a collection trench along the western Site perimeter and a blower and utility flare, were installed in 1999 [Clayton, 1999]. Six IRM gas extraction wells were also installed in 1999 but were subsequently decommissioned with IEPA approval (7 October 2009), following demonstration that methane concentrations were consistently below action levels.

- In 2008, seventeen (17) dual phase (landfill gas and leachate) extraction wells and forty-one (41) passive landfill gas vents were installed, as part of the Remedial Action, on the top and side slopes of the landfill in order to expedite venting of landfill gas. Each of the dual phase extraction wells and passive landfill gas vents was installed with wind-activated turbine vents [Geosyntec, 2010].

- In addition, the perimeter leachate collection trench is designed to intercept and vent landfill gas along the northern, eastern and southeastern perimeters of the Landfill.

As described in the Geosyntec Gas Well and Vent Construction Remedial Action Work Plan, [Geosyntec 2008], the LFG vents were installed down to the leachate water table in accordance with 35 IAC 811.314 (c) (3). In accordance with 35 IAC 811.314 (d), the LFG vents were designed to resist settlement, be chemically resistant to methane and waste, not compromise the integrity of the cover system. In addition, the well vent screens were installed down to near the bottom of the waste to be able to extract leachate, if required, as described in Section 3.2 of this RD Report.

In accordance with 35 IAC 811.314 (d) (12), the GCCS LFG vents were designed with sufficient casing diameter to be able to add active LFG collection system mechanical devices at a later time if necessary to meet the requirements of 35 IAC 811.314 (a) (1), (a) (2) and (a) (3). The existing active gas management system components have been evaluated and incorporated into this RD as part of the contingency plan to convert the passive gas well vents to an active collection system, if necessary.

3.3.4 Analysis

The waste in the Landfill is largely municipal solid waste (MSW) with industrial waste. An estimate of the amount of MSW compared to industrial waste could not be located. The waste was deposited from 1969 until 1988. The thickness of the waste ranges up to approximately 55 feet and the leachate levels are approximately 20 feet below the top of the waste, indicating about half of the waste is unsaturated. After the existing IRM cover is improved and the LMS is installed, it is estimated that the leachate levels will lower following the end of construction.

To assess the potential for gas generation, the U.S EPA Landfill Gas Emissions Model (LandGEM) [U.S.EPA, 2005] was used to estimate the amount of methane that will be generated. The results of calculations that were performed for the design of gas collection system are presented in **Appendix E1**. It was estimated that at the time of closure in 1988, approximately 1,000 scfm (standard cubic feet per minute) of gas was generated.

The effect of gas pressure build up on the stability of the cover system was analyzed to identify the required gas vent spacing. The gas vents and dual phase extraction wells were installed in 2008 with spacing as determined by this analysis. First, a slope stability analysis was completed using cover materials that were assumed to be used in the construction at the time of the analysis. At the time of the analysis the cover was assumed to include (from top to bottom): (i) topsoil; (ii) protective layer; (iii) infiltration drainage layer (double-sided geocomposite); (iv) low permeability layer (low density polyethhylene geomembrane); and (v) foundation layer. However, as a result of the ESD, those cover features are no longer considered; instead the existing IRM cover will be improved. Second, an analysis of the effect of gas pressure build-up was completed and the passive vent spacing was calculated. The analysis is presented in **Appendix E2**.

The analysis indicates the passive vent radius of influence (ROI) of 4-inch diameter vents ranges from 150 to 240 feet on the side slopes (depending upon the steepness of the side slopes and thickness of unsaturated waste) and approximately 300 feet on the crest of the IRM cover. The analysis also demonstrates that because of the relatively high hydraulic conductivity of the waste (~ 1×10^{-3} cm/sec), a gas collection/venting layer across the top of the waste is not necessary. The required passive LFG vent spacing calculations indicated a minimum of 46 gas vents were required. However, a total of 58 gas vents (17 dual phase extraction wells and 41 gas vents) were installed in 2008, to facilitate LFG venting at higher rates. Therefore, it is considered that the existing gas vent spacing is sufficient for improved IRM cover design.

An analysis of the existing blower was conducted to evaluate whether it could be used, if needed, to extract LFG from the new gas well vents (**Appendix E3**). A preliminary collection system piping layout design was completed based on potential future connection to 10 gas well vents. The analysis calculated the head loss in collection pipe extending up to 3,000 feet from the blower to the farthest proposed gas well vent. It was calculated that the head loss was less than two inches of water pressure and that the existing blower could be used to extract 10 to 20 scfm of LFG from 10 select gas extraction wells at one time.

After the Pre-Design Investigation, methane was found above the LEL in GP-28 and GP-30 in the southwest area of the Site; however, there are no exposure points such as buildings or residences near these gas probes. Further, additional gas probes (GP-36 and GP-37 east of GP-28, and GP-34 and GP-35 south of GP-30) were installed farther away from the Landfill and methane has not been detected. Consequently, active soil-gas extraction in these areas is not proposed. The existing GCCS, including passive gas well vents on the Landfill, will relieve gas pressure near the gas probes near the Site perimeter.

Methane was also found in GP-26 and GP-27 along the north perimeter of the Landfill above the LEL. A buried AT&T fiber optic cable is located in the Union Pacific railroad right of way (ROW) adjacent to GP-27. AT&T has been contacted and their representative stated that the cable is located outside of the railroad ballast and no more than 12 feet south of the south railroad track. It may be located farther south only at the location of the stormwater culverts where they would have buried the cable outside the limit of the culvert. The cable is in a 1-½ inch diameter conduit buried 4 to 5 feet below ground surface. There is a splice box located approximately 20 feet east of the farmer's access road east of the Site along the southern edge of the ROW; it is also buried 4 to 5 feet below ground and can only be accessed by obtaining a permit from the railroad. The presence of methane near the fiber optic cable could have the potential to enter the fiber optic trench backfill which could act as a conduit for off-Site migration. However, the fiber optic cable is located across a drainage ditch and at a higher elevation than the Landfill and will be on the downgradient side of the constructed leachate/gas interceptor trenches making it an unlikely landfill gas conduit. Methane is likely to be collected in and vented from the interceptor trench before reaching the fiber optic trench backfill. Because it is unlikely that the fiber optic trench would be a conduit for off-Site migration of landfill gas, active soil-gas extraction in this area is not proposed.

Methane in the four impacted gas probes (GP-26, GP-27, GP-28, and GP-30) and the additional probes installed farther from the landfill (GP-34, GP-35, GP-36, and GP-37) have been and will continue to be monitored in accordance with 35 IAC 811.314 (a) to track methane dissipation as operation of the GCCS continues.

Construction Quality Assurance

The GCCS shall be constructed and monitored under a construction quality assurance (CQA) plan in accordance with 35 IAC Part 811 Subpart E.

3.3.5 Description of the Remedy

The following provides a summary of the elements of the GCCS portion of the remedy. The Pre-final Design Drawings are presented in **Appendix A**. A list of drawings is presented on **Table 3-7**. Specifications for the GCCS are not included in this RD report, because the GCCS was installed in 2008.

Landfill GCCS

The GCCS for the Site includes the seventeen (17) existing dual-phase LFG/leachate extraction wells/vents on the the Landfill and will include a series of approximately 3,800 feet long, gravel-filled dual phase interceptor trenches around the northern, eastern, and southern portions of the perimeter of the Landfill. All of the 17 dual-phase extraction wells were installed in 2008 with well screens below the leachate level to supplement leachate extraction, if necessary, as previously described in Section 3.2 of this RD Report. Gas vent risers that will be installed in the interceptor trenches will also be installed such that active LFG extraction could be implemented if needed at a future date.

The design radius from the passive LFG vent spacing calculations indicate a minimum of 46 gas vents are required. However, a total of 58 gas vents (17 dual phase extraction wells and 41 gas vents) were installed in 2008, to facilitate LFG venting. The 41 LFG vents, which did not need to be constructed as dual phase wells, were installed as standard 4-in diameter LFG vents extending from just above the leachate, through the waste and up through the cover. The tops of the vent casings were installed with wind-activated turbines to faciliate LFG removal and dispersion.

The LFG vents and interceptor trenches will initially operate passively; however, the 17 dual-phase LFG wells are capable of being converted for active extraction if the post-closure monitoring criteria are exceeded. If necessary, some of the LFG extraction well vents can be attached to piping that extends to the existing Site blower/flare assembly and operate actively until the post-closure monitoring criteria are met. To facilitate potential future active LFG extraction, the top of the gas vents have threads to enable removal of the turbines and installation of caps to seal the vent to preclude oxygen intrusion into the waste. The tops of all of the LFG vents and the interceptor trench vent risers are also designed to have the capability to operate passively or be connected to an active system, if necessary.

Gas Monitoring

Prior to 2006, six gas probes were installed within the Landfill area and another 12 were installed in areas outside the limits of waste to the west of the Site. The original six gas probes within the

Landfill area have not been monitored because the probes were either damaged or could not be located when quarterly gas monitoring for the Site began. If these original six gas probes are observed or encountered during improvement of the IRM cover, they will be properly abandoned.

In late 2006, eight additional gas probes were installed outside the limits of waste along the north, east, and south perimeters of the Landfill. In 2011, four additional site perimeter gas probes were installed to monitor conditions at the Site perimeter: GP-34 and GP-35 (to the south of GP-30) and GP-36 and GP-37 (to the east of GP-36). The locations of GP-34 and GP-35 are within the footprint of a proposed stormwater pond at the Site perimeter. Gas probes GP-34 and GP-35 have not shown methane concentrations above 4% of LEL since they were installed. Therefore, gas probes GP-34 and GP-35 are proposed to be abandoned and not to be replaced.

Methane, pressure, and carbon dioxide (CO_2) are monitored on a quarterly schedule in representative gas probes.

The installed gas well vents and planned interceptor trench risers were designed with monitoring ports in the well head piping to enable periodic evaluation of methane concentrations within the vents.

As an additional measure, residential gas blowers were installed in 6 residences in Wycliffe Estates in April 1999 and have been in continuous use.

The long-term gas monitoring program will be presented in the Operation and Maintenance Plan (O&M Plan). A table of contents outlining the O&M Plan is included in **Appendix G**. The final O&M Plan will be submitted to IEPA after (or during) construction and prior to the pre-final construction inspection.

3.4 <u>Landfill Cover System</u>

3.4.1 Overview

The ESD for the Landfill documents that the IRM cover will be improved to minimize the infiltration of precipitation into the landfill, reducing the generation of leachate, landfill gases, and the migration of contaminants to groundwater, soil, and air. The IRM cover will be improved over the areas of the Landfill where the IRM cover does not have a minimum of 3 feet of compacted clay cover (approximately 24 acres) (see **Appendix A**). The improved IRM cover system is estimated to have a hydraulic efficiency of 98%, which meets the ARARs, and is protective of human health and environment [Geosyntec, 2012].

A portion of the existing Landfill vegetative cover (where improvement need to be made) will be removed and temporarily stockpiled and reused to provide vegetative cover for the improved areas. Portions of the existing vegetative cover and underlying impacted soils where there are existing leachate seeps will be disposed at the designated refuse area shown in the drawings. The existing IRM cover will be maintained to the maximum extent possible before, during, and after construction to avoid contact of rainfall and personnel with the waste. The Design Drawings for the improved IRM cover are located in **Appendix A** and the Specifications are located in **Appendix B**.

3.4.2 Pre-Design Investigation

A Pre-Design investigation was conducted in 2006 to assess the existing cover soil properties and geotechnical properties of an adjacent property south and west of the Site for use as a borrow area for cover construction. Summary tables of the results of the Pre-Design Investigation are presented in **Appendix C**. Further details of the investigation are provided in the Pre-Design Field Investigation Report [Geosyntec, 2007b]. For the improved IRM cover, only the west borrow pit is planned to provide clay soils to improve the IRM cover.

In summary, the results of the Pre-Design Investigation indicate the following:

- the soils on the IRM cover are at least 2 feet thick (including topsoil) at 22 of 24 cover soil boring locations and all 4 leachate piezometer borings;
- two cover borings identified that the edge of waste was not accurately located. Cover boring CB-04 was drilled on the south side of the Landfill in a location that was shown on RI drawings to be on the edge of waste; however, waste was encountered and the edge of waste line was moved outward. Gas probe boring GPB-01 for gas probe GP-28 was drilled on the east side of the Landfill that was shown on RI Drawings to be within the edge of waste but no waste was encountered and the edge of waste line was moved inward. These edge of waste adjustments were incorporated into the Drawings.
- the soils are uniformly silty clay (CL) on the existing Landfill cover;
- topsoil is at least 0.5 foot thick at 22 of 24 cover soil boring locations;
- the existing non-topsoil IRM cover soil on the Landfill can be compacted to meet a hydraulic conductivity of less than1 x 10^{-7} cm/sec; and
- the soils in the proposed west borrow area have zones of predominantly silty clay (CL) that can be compacted to meet a maximum hydraulic conductivity of 1 x 10^{-7} cm/sec. Soils that are not suitable for low permeability layer will be spread over the borrow area as grading fill after borrow operations are completed.

Based on the Pre-Design Investigation, the IRM cover soils and the proposed west borrow area soils can be used as Clay Fill.

3.4.3 Design Criteria and ARARs

This section presents the design criteria and ARARs included in the SOW and additional design criteria applicable to the cover. The required landfill standards and related ARARs are primarily contained in 35 IAC Part 811.314 and are presented in this section. Further, the ROD (page 84) requires that the final grading of the total cover system will result in a slope no less than 3%. The ESD specifies that the existing IRM cover will be improved at the Landfill to have a minim 3 foot compacted clay cover, compacted to achieve a permeabiltiy of $1x10^{-7}$ centimeters per second as describe in 35 IAC Part 811.314 (a)(A).

Re-Use of Cover Soils

The existing cover topsoil layer, which has shown to support vegetation at the Landifll, will be stripped, stockpiled and re-used for the topsoil layer on the Landfill. The existing clay cover will be graded at the crest of the landfill to achieve a minimum 3% slope, and any extra low permeability layer soils will be stockpiled and re-used to augment the cover on the side slopes.

All stockpiles are designed to meet erosion and sedimentation controls in accordance with the Boone County Subdivision Regulations, in particular Section 510 "Soil Erosion and Sedimentation Control".

Vegetative Layer

In accordance with the SOW, the Landfill cover will consist of a vegetative layer (topsoil) of a minimum thickness of six inches in depth over the entire landfill cap. The topsoil will have a minimum of 5% natural organic material and capable of supporting vegetation in accordance with 35 IAC 811.314.

Clay Fill (Low Permeability Layer)

Clay Fill shall be a minimum of three (3) feet thick over the entire landfill footprint and have a permeability value equal to or less than 10^{-7} cm/s in accordance with 35 IAC 811.314.

IRM Crest

The low permeability portion of the IRM cover on the crest of the Landfill shall be maintained a minimum of three feet thick. The ESD identified that there is more than three feet of low permeability cover on the crest of the Landfill and in accordance with the ROD, the excess may be reused. After overlying cover soils are stripped, the remaining IRM cover shall be protected against excessive desiccation and wetting in accordance with 35 IAC Part 811.314(c)(4). The IRM cover may require recompaction should excessive desiccation or wetting occur.

Because the crest of the IRM cover has already been accepted by the IEPA, additional testing will not be conducted on the crest of the IRM cover unless the IRM cover on the crest is damaged and requires recompaction or is augmented using additional soil during construction.

Access Road

A road will be constructed on the cover system to provide access for maintenance and inspection purposes. It shall have a gravel base underlain by a geotextile separator fabric to keep the gravel from mixing with Clay Fill and a gravel surface course. The vegetative layer will not be required directly underneath the access road.

Construction Quality Assurance

The cover shall be constructed and monitored under a construction quality assurance (CQA) plan in accordance with 35 IAC Part 811 Subpart E.

3.4.4 Analysis

Slope Stability

The slope stability of the final grades has been evaluated and deemed stable; based upon the previous performance of the landfill cover and the design approach, the final topographic contours will be parallel to the existing contours.

Settlement

Comparison between the 2006 and 2014 grades has been made to evaluate the settlement progress over the entire landfill footprint over this previous eight-year period. Analysis of these data shows that the final cover has uniformly settled approximately one foot over the landfill footprint (**Figure 3-4**). Based on this settlement result, the cover sloped at 3% or greater will be sufficient in combination with a post-closure operation and maintenance plan.

3.4.5 Description of the Remedy

The following provides a summary of the elements of the cover system portion of the remedy described from the top of the cover downward. Design drawings are presented in **Appendix A** and the Specifications are located in **Appendix B**. The list of specifications for the RA construction is presented in **Table 3-6** and a list of drawings is presented on **Table 3-7**.

Vegetative Layer

The vegetative layer will be a minimum six inches in depth over the entire landfill cap. The source of the vegetative layer will be the existing topsoil on the cover that will be stripped, stockpiled and re-used. If additional topsoil is required it will be either obtained from a planned borrow source immediately west of the site, from stormwater pond excavations, or from another approved off-Site source.

Improved IRM Cover - Side Slopes (Clay Fill - Low Permeability Layer)

The existing IRM cover will be improved with additional Clay Fill (low permeability layer) consisting of a silty clay soil (CL) to create a minimum thickness of three (3) feet over the surface of the Landfill. The improved cover shall consist of existing cover soils, new Clay Fill from the west soil borrow pit or from stormwater pond excavations, or from another approved source, if needed.

After the surface topsoil is removed in preparation of final grading, the remaining cover shall be checked with a pocket penetrometer to identify the presence of unstable (soft) areas at the existing seep locations. If soft (pocket penetrometer of less than 1 tsf) areas are identified, existing Clay Fill from these areas will be removed and replaced with new Clay Fill.

Because the existing cover is not being removed prior to compaction, the minimum thickness criterion of three (3)-feet shall be checked on a defined grid using a hand auger after the top of the Clay Fill grade is established.

IRM Cover - Crest

The slope of the crest of the landifll is less than 3% in some areas. Therefore, the topsoil will be stripped and stockpiled and additional Clay Fill will be added to achieve the minimum 3% slope.

The IRM cover currently exists on the crest of the Landfill and shall remain and protected during construction, repaired if damaged and graded to meet a minimum 3% slope. However, because the ESD identified the thickness of the low permeability soil on the crest is thicker than the minimum requirement of three (3) feet, some of the cover topsoil and underlying clay will be removed as part of the grading process and reusedfor the improvement of IRM cover along the sideslopes.

Access Road

The access road base course shall be a minimum 12-inch thick layer constructed of Illinois DOT CA-1 stone aggregate. A separator geotextile underlying the base course shall be a woven polypropylene or polyester. The access road surface course will be a minimum of six-inches thick constructed of Illinois DOT CA-6 crushed stone aggregate.

3.5 Stormwater Management

3.5.1 Overview

The goals of stormwater management are to minimize the need for further cover maintenance, avoid increasing the amount of runoff into the receiving surface water bodies, and meet erosion and sedimentation control requirements during construction until the Site is stabilized.

Following RA construction, the Site will have a series of stormwater benches, detention basins, and erosion controls on and around the Landfill. Stormwater will be discharged into the creek located southeast of the Site, the wetland south of the Site, north of the new west detention basin, and through existing ditches and culverts to the north of the Site.

3.5.2 Design Criteria and ARARs

Stormwater management will include the control of stormwater flow, erosion, and sedimentation to meet applicable portions of 35 IAC Parts 811 and 814, 40 CFR 122.26(b)(14)(x), and the applicable technical requirements of the Boone County Code, Section 508 – drainage and stormwater management facilties.

One goal of stormwater management is to avoid exposing waste materials to rainfall and runoff. Consequently, the requirements of 35 IAC Part 811.103 (a) "Surface Water Drainage- Runoff From Disturbed Areas" 35 IAC Part 103 (b) "Diversion of Runoff From Undisturbed Areas" are typically not applicable. However, during any remedial construction that could temporarily expose waste or contaminated soils to precipitation runon and runoff, 35 IAC Part 811.103 will be required to be met. The applicable activities will include excavation and closure of the leachate surface impoundment and excavation to construct the passive leachate collection trenches. The project specifications assoicated with these construction activities will address the requirements of 35 IAC Part 811.103.

35 IAC Part 811.110 "Closure and Written Closure Plan" paragraph (b) requires that all drainage ways and swales shall be designed to safely pass the runoff from the 100-year, 24-hour precipitation event without scouring or erosion. 35 IAC Part 811.110 (c) requires that the final

configuration of the facility shall be designed in a manner that minimizes the need for further maintenance.

At the county level, stormwater is addressed under "Appendix B – Subdivisions" of the Boone County Code Regulations which require the following:

Section 508.B "Ditches and Swales" Erosion control measures are specified depending upon the grade of the ditch and vary from seeding to culverts.

Section 508.G "Stormwater detention areas" To avoid increase in stormwater peak discharge rates, stormwater detention is required where the development reduces the amount of undeveloped land surface. Specifically, for the 100-year rainfall the release rate from the stormwater detention area must be either 0.2 cfs per acre or less, unless it can be shown by calculations that the discharge rate of the natural outlet channel serving the area is greater.

However, the MIG/DeWane landfill cover modifications are not a land development project that will add impervious area. Modifications are being made to add material to the existing clay cover of the Landfill, and perform grading to better manage local surface runoff. Even without stormwater detention, it is not anticipated that 100-year peak outflows from the landfill site would increase after the project is implemented. In order to provide conservative stormwater management and make net improvements in downstream drainage conditions, stormwater detention will be implemented where feasible to achieve a 0.2 cfs/acre outflow rate limit for the 100-year design storm, based on County criteria.

Additional stormwater detention basin standards from Boone County Code Section 508.G that have been selected for design criteria include:

- Minimum slope 4H:1V
- Minimum pipe diameter: 12 inches
- Minimum bottom slope: 0.5%
- Overflow area must be specified
- Trash grates or covers on inlets and outlets are required.

Boone Coounty Code Section 510 covers "Soil erosion and sedimentation control" requirements for the control of soil erosion and sediment caused by soil disturbance in connection with development activities. In summary, a soil erosion and sedimentation control plan ("SESCP") is required. Paragraph D of the County Code Section 510 describes the contents of the required SESCP. Paragraph F of Section 510 provides specifications for sediment basins, sediment traps, "wet" and "dry" detention, stormwater conveyance channels and stabilization. Paragraph G provides the requirements for maintenance of control measures.

3.5.3 Analysis

The hydrologic analysis was performed using procedures described in the documents, "Urban Hydrology for Small Watersheds, Technical Release 55", (USDA-SCS, 1986). The computer program HEC-HMS was used to perform the hydrologic analysis. The computer program HY-8 was used to perform the hydraulic analysis of the culverts. Microsoft Excel spreadsheets were developed to perform several of the other supporting calculations, such as time of concentration, pond stage-storage, and swale and downchute conveyance capacity.

HEC-HMS was used to determine the stormwater volume and peak flows that must be conveyed and detained for post-project conditions. A HEC-HMS model was also developed to estimate peak flows under existing conditions.

The primary design criteria for the hydrologic design of each stormwater pond is to provide adequate runoff storage volume, combined with the appropriate outlet structure, to restrict the pond's 100-year peak outflow rate to no more than the allowable outflow rates. The existing topography of the site, and proposed runoff conveyance features, led to the siting of four stormwater detention ponds around the landfill site. The pond hydrologic design was completed using HEC-HMS to simulate design trials of pond grading concepts and outlet structures. The "bounce" in the pond's water level (depth of water during the 100-year design storm) was generally targeted to be 4 to 5 feet.

The drainage benches, swales, downchutes and culverts have been designed to effectively convey the runoff from the 100 year, 24 hour design storm.

3.5.4 Description of the Remedy

The following provides a summary of the elements of the stormwater management portion of the remedy. Design Drawings are presented in **Appendix A** and the Specifications are presented in **Appendix B**. The list of specifications for RA construction is presented on **Table 3-6** and a list of drawings is presented on **Table 3-7**. The stormwater management features of the Site that will be in place after completion of construction are summarized as follows:

- the crest of the landfill will be sloped at 3% to avoid ponding of water after accommodating long term settlement;

- drainage benches will be constructed on the Landfill cover to control surface water drainage velocity on the side slopes and minimize maintenance; stormwater benches will be as wide as three feet and direct runoff to downchutes;
- drainage ditches on benches will have slopes ranging from approximately 2% to 4%;
- drainage ditches will have a minimum slope of 1% on adjacent land around the Landfill;
- in general, drainage ditches will be grassed and the seed mix shall be consistent with post closure land use;
- stormwater downchutes will be lined with a fabric-formed concrete or similar product to protect against erosion and will be sufficiently flexible to accommodate settlement and continue to function;
- stormwater detention basins will be located in the west, south, south east and east of the Landfill and discharge to existing drainage features around the Site;
- the west borrow pit will be graded to promote Stormwater discharge into a detention basin;
- disturbed portions around the basin in the west borrow pit will be scarified, 3 inches of topsoil will be placed, fertilized, seeded and mulched. The disturbed portions will be revegetated with grass species suitable for the expected soil and moisture conditions; and
- the stormwater discharge rates from the detention basins shall be no greater than the current discharge rates to avoid additional erosion on the property to the north of the railroad right of way or in the intermittent ditch south and south east of the Landfill.

Stormwater detention facilities have been designed to reduce the 100-year peak discharge from upstream Landfill areas to 0.2 cubic feet per second (cfs) per acre or less. In contrast, 100-year peak discharges from the existing landfill are estimated to range from 5 to 7 cfs per acre. Pond 1, in the northwest corner of the site, also receives stormwater inflow from an upstream offsite residential area. When determining the total allowable peak discharge rate for this particular pond, the allowable discharge rate was calculated by adding the existing peak flow rate from the offsite residential area to a 0.2 cfs per acre contribution from the landfill area. The detailed stormwater design report contained in **Appendix F** presents the calculation of this allowable discharge rate.

Some areas on the fringes of the landfill site have topography that makes it infeasible to provide local stormwater detention or to construct drainage features that can route the water to planned stormwater detention facilities. Even with these areas, no increase in peak outflow is expected because no impervious area is being added and the horizontal extent of clay landfill cover is not being modified. Modeling and calculations presented in the detailed stormwater report in

Appendix F show that even with some fringe areas that drain directly offsite, overall there will be a substantial reduction in peak flow rates from the site compared to existing conditions because of the new Landfill cover benches and four stormwater detention basins that will be constructed. For the north area tributary to the railroad right of way, the 100-year peak flow contribution is reduced from the current 170 cfs to 31 cfs. For the south area tributary to the wetlands south and east of the site, the peak flow contribution is reduced from the current 170 cfs to 29 cfs. For the combined site, 100-year peak flow discharges are reduced from the current 340 cfs to 60 cfs.

The Specifications in **Appendix B** describe the requirements for erosion and sediment control. The Design Drawings in **Appendix A** provide the details of erosion and sedimentation control features.

3.6 <u>Groundwater Remediation</u>

3.6.1 Overview

A groundwater management and monitoring program will be implemented consistent with the requirements of the ROD. The related groundwater management components include establishment of a GMZ, conducting MNA, improving the landfill cap, reducing gas pressure, and removal of leachate at the contaminant source in the Site.

The remedy does not require the implementation of an active groundwater remedy because the relatively low contamination levels of groundwater are expected to be remediated through MNA and other remediation aspects of the RD/RA. MNA has already resulted in improved groundwater quality at the Site, following the installation of the IRM landfill cover in 1993.

Data collected from 2010 through 2013 indicate that MNA has been significantly more effective in reducing COC concentrations in groundwater than the estimates documented in the FFS. The groundwater has improved since the Remedial Investigation; during the 2010, 2011, 2012, and 2013 groundwater monitoring events, there has been only one VOC (benzene) above its MCL or ICIGS at MW06S, and no VOCs were above MCLs or ICIGSs at any other location (see **Table 3-4**). Demonstration of improved groundwater conditions was a significant portion of the ESD signed by IEPA and USEPA in August 2013.

3.6.2 Design Criteria and ARARs

A GMZ, as described in 35 IAC Part 620.250, will be established for areas undergoing remediation through the mechanisms described in the ROD and FFS.

Groundwater action levels have been established in the ROD for the COCs. Action levels have been developed for the West Glacial Pathway and the North Interface Pathway. The two pathways are shown on **Figure 3-1**. The action levels are presented in **Table 3-5**. If action levels are exceeded, a contingency plan shall be implemented in accordance with the ROD to assess the circumstances and consider further reduction of leachate migration to groundwater. Applicable U.S. EPA MNA requirements and guidance will be met, or additional technologies will be implemented to remediate groundwater to applicable water quality criteria for Class I aquifers (35 IAC Part 620, 40 CFR 141).

Pursuant to the requirements of 35 IAC Part 724.195, a groundwater point of compliance shall be established at the Site boundary. To meet the intent of the rule and the current Site conditions, the groundwater point of compliance will be established through the existing monitoring wells outside of the downgradient perimeter (north and west) of the Landfill. A number of monitoring wells north of the Site could not be installed on Site because the limit of waste encroaches the northern Site property and access is limited by the terrain and the railroad right of way where construction is significantly limited. Consequently, the groundwater point of compliance wells are located north of the Union Pacific Railroad ROW on the agricultural property north of the ROW (**Figure 3-1**).

The long-term groundwater monitoring program will provide information on the progress toward natural attenuation achieving the clean-up objectives by providing sampling data on groundwater contaminant migration.

The long-term groundwater monitoring program will be outlined in the Draft Operation and Maintenance Plan (O&M Plan). The table of contents of the O&M Plan is located in **Appendix G**. The final O&M Plan will be submitted after (or during) construction and prior to the pre-final construction inspection with a complete long-term groundwater monitoring program. The long-term groundwater monitoring program shall be implemented after construction. The criteria acceptable to Illinois EPA to adjust the monitoring program will also be defined in the final O&M Plan.

3.6.3 Description of the Remedy

The long-term groundwater monitoring program will assess the progress of MNA towards achieving the clean-up objectives by providing sampling data on contaminant migration within the groundwater. If the results of groundwater monitoring indicates that MNA is not effective, then the contingency for additional leachate removal may be implemented, or in-situ remedial alternatives may be implemented as approved by the IEPA.

Groundwater action levels have been established to trigger a contingency plan for additional leachate removal if natural attenuation is not occurring effectively. Sampling results from monitoring wells located immediately downgradient of the Landfill perimeter in either the West Glacial Pathway or North Interface Pathway will serve as the basis for determining the exceedance of an action level for purposes of triggering the contingent leachate removal plan. Groundwater action levels are specific levels of contaminant concentration for specific contaminant target compounds. The target compound action levels have been designated as triggers for additional remediation if the action levels are met or exceeded and it is confirmed that the exceedances are from Landfill leachate and not another source.

The initial groundwater action levels have been established to be protective of surface water, mainly to protect the Kishwaukee River. The baseline risk assessment did not find the groundwater media to represent a completed pathway for contaminants because groundwater use on Site and in the vicinity of the Site is restricted. The groundwater action levels include seven VOC target compounds, and each compound has two different groundwater action levels. There are separate groundwater action levels for the North Interface Pathway and for the West Glacial Pathway. The action levels are based on surface water quality criteria. These target compounds and their respective action levels are presented in **Table 3-5**.

3.6.4 GMZ Plan

The outline of the GMZ Plan was presented in the RDWP. The following text in normal font provides the requirements to meet the GMZ and the *italic font* provides an update of the work completed to meet the GMZ Plan. A separate formal request to establish a GMZ for the Site will be prepared and submitted to the IEPA based on the following information:

The following has been completed to establish the GMZ:

Use Restriction Agreement. There is an agreement among the MIG/DeWane Landfill Task Force (MLTF) and the L.A.E. Defendants dated 8 January 1999 that requires the L.A.E. Defendants to refrain from use of groundwater within the GMZ on the Site and the property to the south of the Site and refrain from using the Site in any manner that would knowingly interfere with and knowingly and adversely affect the integrity or effectiveness of the remedial measures. The Agreement and all Amendments thereto shall be considered covenants running with the land.

Wycliffe Estate Development Annexation Agreement. There is an Agreement among the City of Belvidere and the Wycliffe Estate Developers effective February 7, 1994 that permits the Owner to connect to the city operated sanitary sewer as well as the City owned and operated water main.

IRM Borrow Pit Property Deed Restriction. The property deed restriction, dated 28 February 1997, places use restrictions on the real property to eliminate potential exposure pathways prohibiting:

- All residential development of the site; and
- All uses of groundwater at the site.

Boone County Zoning Ordinance. Appendix A, Section 17 of the Ordinance version that was adopted April 11, 1984, and amended through December 2002:

- Regulates development in special flood hazard areas and requires a permit to use the "special flood hazard areas";
- Prevents developments that could increase flooding or drainage hazards to others; and
- Protects human life and health from the hazards of flooding.

Appendix A, Section 4 regarding flood plain districts, does not include groundwater extraction or use as a permitted use. Further, it is not potentially considered as a special use.

General information regarding the facility

- Facility name: *MIG/DeWane Landfill Superfund Site.*
- Facility address: 6600 *Logan Avenue, Belvidere, Illinois.*
- Site county location: *Boone County.*
- Illinois EPA, Bureau of Land, and U.S. EPA Identification Numbers: *ILD980497788.*
- A general description of the type of industry, products manufactured, raw materials used, location and size of the facility, including SIC codes: *Solid and hazardous waste disposal, SIC Code 4953 ("refuse systems" including landfills).*
- An identification of specific units (operating or closed) present at the facility for which the GMZ is proposed: *The Landfill unit is shown on* ***Figure 3-1****.*
- A USGS topographic map: *The topographic map is presented in the Design Drawings in* ***Appendix*** *A of this Pre-Final RD Report.*
- A description of the geology and hydrogeology within the proposed GMZ and the surrounding area. *This information is provided in Section 4 of the RI Report [Clayton, 1997].*

- Groundwater classification at the site: *Class 1.*

- A description of the circumstances under which the release to groundwater was identified. *The releases occurred through operation of the Landfill and are detailed in the RI Report [Clayton, 1997].*

Information Regarding the Release

- The chemical constituents released to the groundwater. *A list of constituents is presented in **Table 3-5**.*

- Identification of the chemical constituents detected in groundwater that are above the applicable standard in 35 IAC Part 620. *A list of constituents that have been detected above the applicable standard is presented in **Table 3-4**.*

- A description of how the site has been investigated to determine the source or sources of the release. *A history of site investigations is presented in Section 2 of this Pre-Final RD Report.*

- A description of how groundwater has been monitored to determine the rate and extent of the release. *A history of site investigations is presented in Section 2 of this Pre-Final RD Report.*

- A description of the groundwater monitoring network and groundwater sampling protocols in place at the facility. *The existing groundwater monitoring network is shown on the design drawing "Existing Conditions" and is comprised of 25 monitoring wells in several geologic zones. Groundwater sampling protocols will be presented in the Final O&M Plan and the separate GMZ submittal to IEPA.*

- The schedule for monitoring of the groundwater. *The monitoring schedule will be described in the Final O&M Plan for the Site and the separate GMZ submittal to IEPA.*

- A summary of the results of groundwater monitoring associated with the release at each waste management unit. *A summary of site investigations is presented in Section 2 of this Pre-Final RD Report.*

<u>Definition of the Proposed GMZ</u>

- Scaled drawings will be presented identifying the horizontal and vertical boundaries of the GMZ. *A plan of the GMZ is presented on* ***Figure 3-1****. The GMZ extends down to the bottom of the West Glacial Pathway and the North Interface Pathway.*

<u>Remedial Action Information</u>

- A description of the approved remedial action. *A description of the approved remedial action is presented in Section 3.6.2 of this Pre-Final RD Report, the ESD and in the ROD [U.S. EPA, 2000].*

- A description of how the approved remedial action has impacted the release. *The impact of the final remedial action (improved IRM cover) will not be assessed until after construction. Additionally, the impact of the IRM cover is discussed in the Modified Remedy Technical Memorandum document which was the basis for the ESD for the Site [Geosyntec, 2012].*

- A description of how the approved remedial action is operated and maintained. *An O&M Plan is under development and will be implemented after construction of the RA.*

- A projected schedule for completion of remediation. *RA construction is expected to be completed by the end of 2014.*

- An identification of any and all permits obtained from the Illinois EPA for the remedial action. *A RD/RA Consent Decree was issued under CERCLA to address permit activities.*

- A description of how groundwater at the facility will be monitored following the future completion of the remedy to ensure that the groundwater quality standards have been attained. *An O&M Plan, including a description of monitoring is under development and will be implemented after construction of the RA.*

- A discussion addressing the adequacy of the controls and management of the proposed GMZ at the site. *The adequacy of the controls and management are presented in Seection VIII and X of the Record of Decision.*

- Course of action for future activities and/or request for modification in regards to the proposed GMZ at the site. *The course of action is presented in Sections 3.6.2 and 3.2 of this Pre-Final RD Report.*

Point of Compliance

The Point of Compliance will be established in accordance with 35 IAC Part 620.505(a). Groundwater beyond the Point of Compliance is considered within the GMZ if it is above Class I groundwater standards. *The point of compliance is shown as a delineation around the north and west side of the Landfill defined on **Figure 3-1**.*

4. LONG-TERM OPERATION AND MAINTENANCE

The table of contents of the O&M Plan is included in **Appendix G**. The long-term operation and maintenance of the Landfill will be discussed in the O&M Plan submitted under separate cover. The final O&M Plan will be submitted to IEPA after (or during) construction and prior to the pre-final construction inspection.

5. OTHER SITE REMEDIAL ACTIVITIES

5.1 Overview

During the RA construction, there will be several activities that will be conducted to facilitate those RA activities required by the CD. In summary, they include:

- Investigation derived waste (IDW) management;
- Abandoned gas management system decommissioning; and
- Fencing the west and southwest detention ponds and the west borrow pit during construction activities.

5.2 Description of the Remedy

IDW Management

IDW includes any existing drums of stored RI and Pre-Design Investigation materials and any other waste generated during construction, such as contaminated materials from trench excavation and leachate/gas well drilling cuttings (waste and impacted soils).

The IDW will be moved to the crest of the landfill. The clay on the crest of the Landfill makes up the IRM cover and is up to 19 feet thick, well in excess of the required minimum 3-foot thickness. To avoid off Site disposal of waste, a trench will be excavated in the excess clay cover soils at locations designed by the Engineer and the IDW shall be placed in the trenches and covered with the excavated clay soils. The trench may be up to 15 feet deep and will not fully penetrate the IRM cover into waste. If necessary, more than one trench will be excavated. The required minimum IRM low permeability cover thickness of three feet will be achieved over the IDW.

When the trenches are open, runoff will be diverted away from the open excavation. Further, OSHA safety requirements will be followed for trenches, such as benching the side slopes and placing barricades around the perimeter of the open excavation.

Abandoned Gas Management System Decommissioning

The abandoned gas management facility on the east side of the Site will be dismantled and placed in the IDW trench excavation. The materials to be put in the Landfill include fencing, a small shed and metal and wood debris. Because there are metal objects that could ultimately puncture the overlying cover due to post-closure settlement, linear objects will be placed horizontally in the trench and the objects will be covered by a layer of clay that is no less than five feet thick.

Fencing

The detention ponds in the west borrow area and southwest portion of the site will be permanently fenced to prevent unathorized access. Additionally, the west borrow area used for the improved IRM cover soils will be fenced during contruction activities to prevent unauthorized access.

6. CLEAN-UP VERIFICATION METHODS

Clean-up verification methods will be required for the GMZ and for the leachate surface impoundment east of the Landfill. Groundwater clean-up methods will be provided in the long-term groundwater monitoring plan that are included in the O&M Plan.

Sediment clean-up methods, sampling and criteria for the leachate impoundment closure will be provided in the Remedial Action Work Plan, which will be submitted to IEPA following this Pre-final RD Report.

7. CONTRACTING STRATEGY AND PROJECT SCHEDULE

7.1 Contracting Strategy

BFINA will prepare a request for bid (RFB) that will include Bid Documents such as this Pre-Final RD report (or the Final RD), General Conditions, Measurement and Payment Conditions, Bid Form, and other administrative Bid Documents. In addition, the RA Work Plan has been prepared with the Pre-Final design for use in the Bid Documents. The RFB will be sent as many as five Bidders that will have been prequalified through the knowledge of BFINA or the Engineer.

Bids will be evaluated against pre-established selection criteria, and one or two Bidders will be interviewed prior to selection. The selected Bidder will be proposed as the Supervising Contractor, and BFINA will notify the IEPA in accordance with page 19 of the CD. IEPA may either issue a notice of disapproval or an authorization to proceed.

7.2 Project Schedule

The preliminary construction schedule is presented in **Figure 7-1**. The schedule presents the RA phase of the project from initiation of bidding through construction. The schedule is subject to change based on the actual schedule provided by the winning bidder.

8. REFERENCES

Bonaparte, R., Daniel, D., and Koerner, R., "Assessment and Recommendations for Improving the Performance of Waste Containment Systems", United States Environmental Protection Agency, Report Number EPA/600/R-02/099, 2002.

Camp Dressler & McKee, "Final Report of Human Health and Ecological Risk Assessment for the , MIG/DeWane Landfill Superfund Site", 1997.

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Clayton Environmental Consultants, "Groundwater/Soil-Gas Sampling Report", July 2000.

Geosyntec Consultants, "Remedial Design Work Plan, MIG/DeWane Landfill Superfund Site", September 2006, as suplemented by the "Remedial Design Quality Assurance Project Plan", November 2006.

Geosyntec Consultants, "Revised Alternative Cover Evaluation Report, MIG/DeWane Landfill Superfund Site", January 2007a.

Geosyntec Consultants, "Pre-Design Field Investigation Report, MIG/DeWane Landfill Superfund Site", 12 April 2007b.

Geosyntec Consultants, "Gas Well and Vent Construction Remedial Action Work Plan", 11 September 2008

Geosyntec Consultants, "Technical Memorandum – Modified Remedy, MIG/DeWane Landfill Site, Belvidere, IL", 05 June 2012.

Golder Services, "Interim Remedial Measures Construction Completion Report, MIG/DeWane Landfill", 1993.

U.S. EPA, "Decalaration for the Record of Decision, MIG/DeWane Landfill Superfund Site", March 2000.

U.S. EPA, "Landfill Gas Emissions Model (LandGEM) Version 3.02", May 2005, Publication EPA-600/R-05/047 by Amy Alexander, Clint Burklin, and Amanda Singleton.

U.S. EPA, "RD/RA Consent Decree, MIG/DeWane Landfill Superfund Site", March 2006.

U.S. Geologic Survey, "Belvidere North, Illinois Topographic Map", (1993).

TABLES

Table 3-1
Summary of Leachate Level Measurement Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Location ID	Northing	Easting	Leachate Elevation (ft)
Historical Leachate Elevations			
LS-01	2036866.32	854521.77	793.50
LS-02	2036926.73	854543.12	791.20
LS-03	2036985.59	854615.78	790.60
LS-04	2036992.88	854629.06	789.80
LS-05	2036991.32	854645.21	789.60
LS-06	2036976.21	854695.21	792.20
LS-07	2036980.64	854722.81	791.60
LS-08	2036975.43	854766.04	792.60
LS-09	2036971.27	854791.56	793.30
LS-10	2036968.4	854812.39	794.50
LS-11	2036965.54	854854.06	794.70
LS-12	2036956.94	854889.74	795.00
LS-13	2036952	854908.49	795.40
LS-14	2036950.43	854926.46	793.80
LS-15	2036937.93	854981.14	792.90
LS-16	2036911.11	855023.33	792.90
LS-17	2036847.57	855192.34	791.80
LS-18	2036833.77	855245.47	790.80
LS-19	2036809.55	855270.99	792.00
LS-20	2036686.37	855460.83	807.20
LS-21	2036547.31	855759.79	806.60
LS-22	2036230.12	856278.8	788.50
LS-23	2036096.01	855971.25	808.60
LS-24	2035677.26	855941.04	779.50
LS-25	2035588.71	855784.79	783.00
LS-26	2035686.11	855572.81	801.90
LS-27	2035670.48	855539.48	802.10
LS-28	2035679.34	855445.21	803.90
LS-29	2035588.71	855335.31	788.50
LW-1	2036093.01	854787.03	808.40
LW-2	2036494.36	855202.84	806.30
December 2008 Leachate Levels			
DP-01	2036729.42	854754.03	802.1
DP-02	2036534.35	854715.34	798.7
DP-04	2035985.4	854669.37	800
DP-05	2036377.69	855281.44	802.1
DP-06	2036044.29	854928.97	821
DP-07	2036493.59	854861.42	798.2
DP-08	2036208.87	855089.96	803.5
DP-09	2036191.81	855329.84	792.8
DP-10	2036439.9	855073.80	798.8
DP-11	2036339.57	855493.77	790.7
DP-12	2036031.73	855436.51	800.7
DP-13	2036164.6	855582.63	794.3
DP-15	2036271.65	855703.64	794.5
DP-16	2036398.67	855811.52	799.3
GV-01	2036675.37	854575.36	800.4
GV-03	2036361.32	854579.51	805.95
GV-05	2036039.45	854559.82	811.2
GV-06	2035802.41	854626.92	808.4
GV-07	2035771.78	854817.76	800.65
GV-08	2035743.9	854976.18	791.24
GV-09	2035904.35	854807.00	808.2
GV-10	2035898.2	855051.20	807.2

Table 3-1
Summary of Leachate Level Measurement Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

GV-11	2035973.8	855184.79	804.8
GV-14	2035835.64	855656.46	795.3
GV-15	2035693.15	855792.55	782.7
GV-16	2035839.14	855829.94	788.4
GV-17	2035888.81	855985.84	786.10
GV-18	2035973.77	855902.43	797.50
GV-20	2036320.77	855975.01	802.40
GV-21	2036467.22	855647.33	808.60
GV-22	2036654.86	855344.23	803.60
GV-23	2036710.13	855164.26	807.00
GV-24	2036830.99	854915.97	803.10
GV-25	2036892.80	854721.02	801.10
GV-26	2036834.79	854625.38	802.61
GV-27	2035765.74	855166.54	799.36
GV-30	2036135.97	854750.34	822.80
GV-31	2036060.11	855794.73	810.70
GV-32	2036202.35	855861.98	817.70
GV-33	2036654.14	854944.17	810.60
GV-34	2036257.64	854877.83	807.40
GV-35	2036587.00	855177.18	813.70
GV-36	2036531.71	855357.26	812.00
GV-37	2035899.94	854957.44	811.30
GV-38	2036874.39	854804.15	803.88
GV-39	2035732.78	854697.63	802.40
GV-40	2035724.20	854873.60	792.05
GV-41	2035717.23	855043.67	791.33

Notes:

LS = Leachate Seep
LW = Leachate Well

DP = Dual Phase
GV = Gas Vent

Historical leachate elevations from leachate seeps shown on Arc Design, Inc. "Existing Conditions Site Map", dated 1/15/2007 and LW elevations from 11 September 1995

December 2008 leachate levels were measured by Geosyntec Consultants

Coordinate system for Northing and Easting is NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet□

Table 3-2
Leachate Waste Characterization
Comparison to Hazardous Waste Criteria
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Constituent	Historical Reported Result	POTW-Composite 11/29/2006	POTW-Composite 4/8/2010	POTW-Composite 12/16/2011	Advanced Waste Requirements (RCRA 40 261.24) CRR	Hazardous Waste Requirements (RCRA 40 CFR 261.24)
Arsenic	0.004	**0.005**	<0.002	**0.025**	5.0	5.0
Barium	< 1.0	**0.141**	**0.128**	**0.77**	100	100
Cadmium	< 0.001	<0.001	<0.001	<0.001	0.5	0.5
Carbon tetrachloride	< 0.05	<0.005	<0.005	<0.005	0.50	0.50
Chlordane	NR	<0.001 (1)	<0.001 (1)	<0.001 (1)	0.03	0.03
Chlorobenzene	< 0.05	**0.0088**	**0.0124**	**0.0114**	100	100
Chloroform	< 0.05	<0.001	<0.001	<0.001	6.0	6.0
Chromium	0.0	**0.017**	**0.017**	**0.12**	5.0	5.0
o-Cresol	NR	<0.020 (2)	<0.010 (2)	<0.010 (2)	200	200
m-Cresol	NR	**0.547 (2)**	**0.019 (2)**	**0.60 (2)**	200	200
p-Cresol	NR				200	200
2,4-D	< 0.5	NA	NA	NA	10	10
1,4-Dichlorobenzene	< 0.1	<0.020	**0.0077**	**0.0101**	7.5	7.5
1,2-Dichloroethane	< 0.05	<0.005	<0.005	<0.005	0.5	0.5
2,4-Dinitrotoluene	< 0.1	<0.020	<0.010	<0.010	0.13	0.13
Endrin	< 0.001	<0.0001	<0.0001	<0.0001	0.02	0.02
Heptachlor (and its hydroxide)	<0.005	<0.0001 (3)	<0.0001 (3)	<0.0001 (3)	0.008	0.008
Hexachlorobenzene	< 0.01	<0.020	<0.010	<0.010	0.130	0.130
Hexachloro-1,3-butadiene	< 0.01	<0.020	<0.010	<0.010	0.50	0.50
Hexachloroethane	< 0.1	<0.010	<0.005	<0.005	3.0	3.0
Lead	< 0.002	**0.0147**	**0.015**	**0.05**	5.0	5.0
Lindane gamma-BHC	<0.005	<0.00005	<0.00005	<0.00005	0.4	0.4

Notes:
All units are mg/L unless listed.
Only analytes that were detected or have a Hazardous Waste Characteristic Criterion are presented.
NS = No Standard
NR = Not required by the QAPP or lab method
NA = Not analyzed
(1) alpha-chlordane and gamma-chlordane were each reported as <0.5 ug/L. The sum of the isomers is less than <1 ug/L.
(2) not analyzed in the composite; the maximum result (or detection limit) in samples at LP-1, LP-2, LP-3, and LP-4 is presented.
(3) Heptachlor and Heptachlor epoxide were each reported as <0.05 ug/L. The sum of the compounds is less than <0.1 ug/L.

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Leachate Wa. racterization
Comparison to Haz..dous Waste Criteria
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Constituent	Historical Reported Result	POTW-Composite 11/29/2006	POTW-Composite 4/8/2010	POTW-Composite 12/16/2011	Advanced Waste Requirements (RCRA 40 261.24) CRR	Hazardous Waste Requirements (RCRA 40 CFR 261.24)
Mercury	< 0.0005	<0.0005	<0.0005	<0.0005	0.20	0.20
Methoxychlor	<0.005	<0.0005	<0.0005	<0.0005	10.0	10.0
Methyl Ethyl Ketone	NR	**4.64**[2]	**0.0114**[2]	**1.54**[2]	200	200
Nitrobenzene	< 0.01	<0.020	<0.010	<0.010	2.0	2.0
Pentachlorophenol	< 0.5	<0.020	<0.010	<0.010	100.0	100.0
Pyridine	< 0.5	NA	NA	NA	5.0	5.0
Selenium	< 0.002	<0.002	<0.002	<0.002	1.0	1.0
Silver	< 0.001	<0.001	<0.001	<0.002	5.0	5.0
Tetrachloroethylene	NR	<0.005	<0.005	<0.005	0.7	0.7
Toxaphene	< 0.01	<0.001	<0.001	<0.001	0.5	0.5
Trichloroethylene	NR	<0.005	<0.005	<0.005	0.7	0.7
2,4,5-Trichlorophenol	< 0.1	<0.020[2]	<0.010[2]	<0.010[2]	400	400
2,4,6-Trichlorophenol	< 0.1	<0.020	<0.010	<0.010	2.0	2.0
2,4,5-TP (Silvex)	< 0.5	NA	NA	NA	1.0	1.0
Vinyl chloride	< 0.1	**0.0022**	<0.002	<0.002	0.200	0.200
pH (St. Units)	**7.07**	**7.02**	**7.00**	**7.08**	NS	between 2 and 12.5
Reactive Sulfide	<10	NA	NA	NA	NS	Not reactive
Reactive Cyanide	<10	NA	NA	NA	NS	Not reactive
Flashpoint (deg F)	>212	NA	NA	NA	NS	> 140 deg F

Notes:
All units are mg/L unless listed.
Only analytes that were detected or have a Hazardous Waste Characteristic Criterion are presented.
NS = Not Specified
NR = Not required by the QAPP or lab method
NA = Not analyzed
(1) alpha-chlordane and gamma-chlordane were each reported as <0.5 ug/L. The sum of the isomers is less than <1 ug/L.
(2) not analyzed in the composite; the maximum result (or detection limit) in samples at LP-1, LP-2, LP-3, and LP-4 is presented.
(3) Heptachlor and Heptachlor epoxide were each reported as <0.05 ug/L. The sum of the compounds is less than <0.1 ug/L.

Table 3-3
Leachate Analytical Summary
Compared to POTW Criteria
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Constituent [1]	LP-01 Reported Result (mg/L)	LP-02 Reported Result (mg/L)	LP-03 Reported Result (mg/L)	LP-04 Reported Result (mg/L)	POTW-Composite (mg/L)	POTW-Composite (mg/L)	POTW-Composite (mg/L)	RRWRD POTW Criteria (mg/L)
	11/29/2006	11/29/2006	11/29/2006	11/29/2006	11/29/2006	4/8/2010	12/16/2010	
Volatile Organic Compounds								
Acetone	**2.26**	< 0.100	< 0.100	< 0.100	**2.26[2]**	<0.10[2]	**0.849[2]**	NS
Benzene	**0.0096**	< 0.005	< 0.005	**0.0111**	**0.0067**	<0.005	<0.005	0.014
Bromomethane	< 0.001	< 0.005	< 0.005	< 0.005	<0.010	<0.010	<0.010	0.305
Carbon tetrachloride	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.005	0.011
Chlorobenzene	< 0.005	**0.0092**	**0.012**	**0.0178**	**0.0088**	**0.0124**	**0.0114**	2.29
Chloroethane	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	5.88
Chloroform	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	<0.001	0.06
Chloromethane	< 0.01	< 0.01	< 0.01	< 0.01	<0.010	<0.010	<0.010	0.557
1,4-Dichlorobenzene	< 0.02	< 0.02	< 0.02	< 0.02	<0.020	**0.0077**	**0.0101**	NS
1,1-Dichloroethane	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.005	1.685
1,2-Dichloroethane	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.005	0.168
1,1-Dichloroethene	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.005	0.016
cis-1,2-Dichloroethene	< 0.005	< 0.005	< 0.005	**0.0276**	<0.001	<0.001	<0.001	NS
1,2-Dichloropropane	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.005	4.289
Ethylbenzene	**0.0562**	**0.126**	**0.0557**	**0.196**	**0.0788**	**0.0428**	**0.0546**	1.659
Methylene chloride	**0.278**	< 0.005	< 0.005	**0.0106**	**0.0930**	<0.005	<0.005	4.139
Methyl Ethyl Ketone	**4.640**	< 0.010	< 0.010	**0.656**	**4.64[2]**	**0.0114[2]**	**1.54[2]**	NS
4-Methyl-2-pentanone	**0.0967**	< 0.010	< 0.010	**0.174**	**0.174[2]**	<0.10[2]	**0.0477[2]**	NS
Tetrachloroethene	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.005	0.945
1,1,2,2-Tetrachloroethane	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	1.847
Toluene	**0.123**	< 0.005	< 0.005	< 0.005	**0.0915**	<0.005	<0.005	2.075
trans-1,2-Dichloroethene	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	2.04
1,1,1-Trichloroethane	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.005	2.759
1,1,2-Trichloroethane	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	1.601
Trichloroethylene	**0.0059**	NR	NR	NR	<0.005	<0.005	<0.005	0.026
Xylene	**0.0609**	**0.28**	**0.148**	**0.42**	**0.42[2]**	**0.335[2]**	**0.43[2]**	NS
Vinyl chloride	< 0.002	< 0.002	< 0.002	**0.0049**	**0.0022**	<0.002	<0.002	0.012
Semivolatile Organics								
Acenaphthene	< 0.02	< 0.02	< 0.02	< 0.01	**0.020**	<0.010	<0.010	NS
Benzoic Acid	**3.470**	< 0.100	< 0.020	< 0100	**3.47[2]**	<0.050[2]	**0.86[2]**	NS
bis(2-Ethylhexyl) phthalate	<0.010	<0.010	<0.010	<0.010	<0.010	**0.049**	**0.014**	NS
Diethyl Phthalate	**0.082**	< 0.020	< 0.020	< 0.020	**0.0280**	<0.010	<0.010	NS
3 & 4-Methylphenol	**0.547**	< 0.020	< 0.020	**0.059**	**0.547[2]**	**0.019[2]**	**0.60[2]**	NS
Naphthalene	< 0.02	< 0.02	< 0.02	< 0.02	<0.020	**0.0110**	**0.0190**	NS
Phenol (Total)	**0.122**	< 0.02	< 0.02	< 0.02	**0.230**	**0.035**	**0.110**	Report

Notes:
1. Only analytes that were detected or have a POTW discharge limit are presented.
2. Not analyzed in the composite; the maximum result (or detection limit) in samples at LP-1, LP-2, LP-3, and LP-4 is presented.
NS = No Standard. POTW limits found in Title 2 of the Rock River Water Reclamation District Code of Ordinances:
NR = Not required by either the QAPP or the lab method.

Table 3-3
Leachate Analytical Summary
Compared to POTW Criteria
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Constituent [1]	LP-01 Reported Result (mg/L)	LP-02 Reported Result (mg/L)	LP-03 Reported Result (mg/L)	LP-04 Reported Result (mg/L)	POTW-Composite (mg/L)	POTW-Composite (mg/L)	POTW-Composite (mg/L)	RRWRD POTW Criteria (mg/L)
PCBs								
Aroclor-1016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	Prohibited
Aroclor-1221	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	Prohibited
Aroclor-1232	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	Prohibited
Aroclor-1242	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	Prohibited
Aroclor-1248	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	Prohibited
Aroclor-1254	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	Prohibited
Aroclor-1260	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	Prohibited
Total Metals								
Antimony	**0.027**	**0.007**	< 0.006	< 0.006	**0.011**	<0.006	<0.006	NS
Arsenic	< 0.002	**0.004**	0.008	< 0.002	**0.005**	<0.002	0.025	0.6
Barium	**0.067**	**0.334**	**0.097**	**0.118**	**0.141**	**0.128**	**0.77**	NS
Cadmium	**0.002**	< 0.001	< 0.001	< 0.001	<0.001	<0.001	<0.001	1.3
Chromium *(total)*	**0.017**	**0.004**	**0.03**	**0.009**	**0.017**	**0.017**	**0.12**	12
Chromium *(total hexavalent)*	< 0.05	< 0.05	< 0.05	< 0.05	<0.05	<0.005	<0.05	8.0
Copper	< 0.001	**0.003**	**0.006**	**0.006**	**0.007**	<0.001	<0.001	0.8
Iron	**393**	**52.9**	**34**	**55.9**	**78.3**	**54.4**	**258**	NS
Lead	**0.017**	**0.003**	**0.003**	**0.034**	**0.0147**	**0.015**	**0.05**	2.5
Manganese	**4.86**	**0.951**	**1.74**	**0.864**	**1.42**	**0.693**	**1.62**	50
Mercury	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.0005	<0.0005	<0.0005	0.4
Molybdenum	< 0.01	< 0.01	< 0.01	< 0.01	<0.01	<0.01	<0.01	4.0
Nickel	**0.426**	**0.113**	**0.082**	**0.048**	**0.175**	**0.098**	**1.09**	2.0
Selenium	< 0.002	< 0.002	< 0.002	< 0.002	<0.002	<0.002	<0.002	0.8
Silver	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	<0.001	<0.002	1.6
Zinc	**1.41**	**0.04**	**0.035**	**0.399**	**0.487**	**0.459**	**0.415**	4.6
Inorganics								
Chloride	**4900**	**370**	**260**	**460**	**1550**	**660**	**1390**	NS
Ammonia-N	**540**	**220**	**180**	**180**	**280**	**169**	**339**	Report
Cyanide, total	< 0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.005	1.7
pH (St. Units)	NR	NR	NR	NR	**7.02**	**7.00**	**7.08**	between 2 and 12.5
Conventional Pollutants								
Oil & Grease (polar)	NR	NR	NR	NR	**4**	< 1	<1	900
Oil & Grease (non-polar)	NR	NR	NR	NR	<1	<1	<1	150
BOD (5 day)	NR	NR	NR	NR	**735**	**63**	**202**	Report
Total Suspended Solids	NR	NR	NR	NR	**202**	**220**	**122**	Report

Notes:
1. Only analytes that were detected or have a POTW discharge limit are presented.
2. Not analyzed in the composite; the maximum result (or detection limit) in samples at LP-1, LP-2, LP-3, and LP-4 is presented.
NS = No Standard. POTW limits found in Title 2 of the Rock River Water Reclamation District Code of Ordinances:
NR = Not required by either the QAPP or the lab method.

Table 3-4

Summary of Historical Groundwater Analytical Detections

MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Location							MW-01D						MW-01S						MW-02D			
Date Sampled	Units	MCL	IL Class I GW Standard	Action Levels West Pathway	Action Levels North Pathway	MAX Historical	10/1/1993	10/1/1993-DUP	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	10/1/1993	10/1/1993-DUP	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	10/1/1993	10/1/1993-DUP	12/1/1994	12/1/1994-DUP
VOC																						
1,1,1-Trichloroethane	µg/L	200	200	NL	NL	22	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	<1 U
1,1-Dichloroethane	µg/L	NS	700	NL	NL	56	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	<1 U
1,1-Dichloroethene	µg/L	7	7	135,000	2,300	15	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	**15**	NA	<1 U	<1 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	0.2	NL	NL	0.2 J	NA	NA	<1 U	NA	NA	NA	NA	NA	<1 U	NA	NA	NA	NA	NA	<1 U	<1 U
1,2-Dichloroethane	µg/L	5	5	NL	NL	12	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	<1 U
1,2-Dichloroethene (Total)	µg/L	NS	NS	NL	NL	190	<10 U	NA	NA	NA	NA	NA	<10 U	NA	NA	NA	NA	NA	**190**	NA	NA	NA
1,2-Dichloropropane	µg/L	5	5	850	370	33	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	<1 U
1,4-Dioxane	µg/L	NS	NS	NL	NL	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	µg/L	NS	6300	NL	NL	0.00	<10 U	NA	<7 U	NA	NA	NA	<10 U	NA	<5 U	NA	NA	NA	<10 U	NA	<5 U	<5 U
Benzene	µg/L	5	5	6,300	1,370	12	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	<1 U
Bromomethane	µg/L	NS	9.8	NL	NL	0.10	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	<1 U
Carbon disulfide	µg/L	NS	700	NL	NL	0.00	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	<1 U
Chlorobenzene	µg/L	100	100	NL	NL	4	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	<1 U
Chloroethane	µg/L	NS	NS	NL	NL	26	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	<1 U
Chloroform	µg/L	80	0.2	NL	NL	10	<10 U	NA	<1 U	NA	**0.1 J**	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	<1 U
Chloromethane	µg/L	NS	NS	NL	NL	5	<10 U	NA	<1 U	NA	**0.3 J**	NA	<10 U	NA	<1 U	NA	**0.4 J**	NA	<10 U	NA	<1 U	<1 U
cis-1,2-Dichloroethene	µg/L	70	70	NL	NL	59	NA	NA	<1 U	NA	<1 U	NA	NA	NA	<1 U	NA	<1 U	NA	NA	NA	<1 U	<1 U
Ethyl benzene	µg/L	700	700	NL	NL	14	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	<1 U
Methylene chloride	µg/L	5	5	13,000,000	10,333,000	12	<10 U	NA	<2 U	NA	<2 U	NA	<10 U	NA	<2 U	NA	<2 U	NA	<10 U	NA	<2 U	<2 U
Tetrachloroethene	µg/L	5	5	880	180	10	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	<1 U
Toluene	µg/L	1000	1000	NL	NL	54	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	<1 U
trans-1,2-Dichloroethene	µg/L	100	100	NL	NL	3	NA	NA	<1 U	NA	<1 U	NA	NA	NA	<1 U	NA	<1 U	NA	NA	NA	<1 U	<1 U
Trichloroethene	µg/L	5	5	2,530	910	47	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	**5 J**	NA	<1 U	<1 U
Vinyl chloride	µg/L	2	2	10,580	4,770	28	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	<1 U
Xylene, Total	µg/L	10000	10000	NL	NL	33	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 U	NA	<1 U	<1 U
SVOC																						
2-Methylnaphthalene	µg/L	NS	NS	NL	NL	0.00	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA
2-Methylphenol	µg/L	NS	350	NL	NL	0.00	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA
bis(2-Ethylhexyl) phthalate	µg/L	6	6	NL	NL	27.00	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	**2 J**	NA	**1 J**	NA
Diethylphthalate	µg/L	NS	5600	NL	NL	19.00	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA
Di-n-butylphthalate	µg/L	NS	700	NL	NL	0.00	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	**1 J**	NA
Naphthalene	µg/L	NS	140	NL	NL	0.00	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 U	NA
Metals																						
Antimony	mg/L	0.006	0.006	NL	NL	0.0034	<0.0015 U	**0.0045 J**	**0.0017 B**	<0.0018 U	<0.001 U	<0.001 U	<0.0015 U	**0.0034 J**	**0.0032 B**	<0.0054 U	<0.001 U	<0.001 U	<0.0015 U	<0.0015 U	**0.0011 B**	<0.001 U
Arsenic	mg/L	0.010	0.05	NL	NL	0.056	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.003 U	<0.003 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.003 U	<0.003 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U
Barium	mg/L	2.0	2.0	NL	NL	1.03	**0.0622 J**	**0.0606 J**	**0.061 B**	**0.0543 B**	**0.0599 B**	**0.0589 B**	**0.0659 J**	**0.0647 J**	**0.0548 B**	**0.0497 B**	**0.0612 B**	**0.0526 B**	**0.0697 J**	**0.0714 J**	**0.0635 B**	**0.0643 B**
Boron	mg/L	NS	2.0	NL	NL	3.56	<0.1 U	<0.1 U	<0.1 U	<0.1 U	**0.0154 B**	NA	<0.1 U	<0.1 U	<0.1 U	<0.1 U	**0.0536 B**	NA	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Chromium	mg/L	0.1	0.1	NL	NL	0.26	<0.003 U	<0.003 U	<0.002 U	<0.002 U	<0.001 U	<0.001 U	<0.003 U	<0.003 U	**0.0351**	<0.0039 U	**0.264**	**0.0017**	<0.003 U	<0.003 U	**0.0029 B**	<0.002 U
Cobalt	mg/L	NS	1.0	NL	NL	0.022	**0.0043 J**	**0.0032 J**	<0.003 U	<0.003 U	<0.001 U	<0.001 U	**0.0039 J**	<0.003 U	<0.003 U	<0.003 U	**0.0055 B**	<0.001 U	**0.0042 J**	<0.003 U	<0.003 U	<0.003 U
Copper	mg/L	1.3	0.65	NL	NL	0.076	<0.0116 U	**0.0346**	<0.002 U	<0.001 U	<0.002 U	<0.002 U	<0.00218 U	**0.0759**	<0.004 U	<0.0114 U	<0.002 U	<0.002 U	<0.0116 U	**0.0206 J**	<0.002 U	<0.0043 U
Iron	mg/L	NS	5.0	NL	NL	29.90	**1.24**	**0.748**	**0.627**	**0.468**	**0.536**	**0.679**	**0.0898 J**	<0.087 U	**0.704**	**0.191**	**3.92**	<0.015 U	**0.173**	**0.167**	<0.102 U	<0.0801 U
Lead	mg/L	0.015	0.0075	NL	NL	0.13	<0.001 U	<0.001 U	<0.002 U	<0.001 U	<0.002 U	<0.002 U	<0.001 U	**0.0018 J**	<0.001 U	<0.001 U	**0.0021 B**	**0.0023 B**	**0.0087**	**0.0016 J**	<0.001 U	<0.001 U
Manganese	mg/L	NS	0.15	NL	NL	2.77	**0.078**	**0.0579**	**0.0522**	**0.0474**	**0.0491**	**0.0546**	**0.0104 J**	**0.0104 J**	**0.0244**	**0.0088 B**	**0.0585**	**0.0073 B**	**0.0478**	**0.0527**	**0.0569**	**0.0587**
Mercury	mg/L	0.002	0.002	NL	NL	0.0052	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U
Nickel	mg/L	NS	0.1	NL	NL	0.44	<0.011 U	<0.011 U	**0.0081 B**	<0.0093 U	**0.0107 B**	**0.0101 B**	<0.011 U	<0.011 U	**0.164**	**0.145**	**0.209**	**0.178**	<0.011 U	<0.011 U	**0.0107 B**	**0.0135 B**
Zinc	mg/L	NS	5.0	NL	NL	7.76	**0.0186 J**	**0.0161 J**	**0.0262**	<0.0142 U	**0.004 B**	**0.0046 B**	**0.0383**	**0.033**	**0.0669**	<0.01 U	**0.0102 B**	**0.0081 B**	**0.0267**	**0.02**	**0.021**	**0.026**
Inorganics																						
Cyanide	mg/L	0.2	0.2	NL	NL	0.0080	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.01 U	NA	<0.01 U	<0.01 U
Sulfide	mg/L	NS	NS	NL	NL	0.30	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U	<0.001 U

Notes:
1. Bolded cells indicate detection
2. D=Deep
3. S=Shallow
4. NA=Not Analyzed
5. Units for VOCs and SVOCs are µg/L
6. Units for metals & inorganics are mg/L
7. Shaded cells indicate exceedance of MCL or Illinois Class I Groundwater Standard
8. NS=No Standard for MCL values or Illinois Class I Groundwater
9. R=Replacement
10. DUP=Duplicate Sample
11. MCLs can be found at http://www.epa.gov/safewater/contaminants/index.html
12. This table includes analytical results for parameters detected at any time at the Site. If a parameter was never detected it is not included.
13. The Illinois Class I Groundwater Standards are located in Section 620.410 of Title 35 of the Illinois Administrative Code

Data Qualifiers:
1. U indicates the analyte was analyzed for, but was not detected above the report sample quantitation limit
2. UJ indicates the analyte was not detected above the reported sample quantitation limit, however, the reported quantitation limit is approximate
3. J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
4. B indicates the analyte result was between IDL (instrument detection limit) and contract required detection limit
5. N indicates spiked sample recovery not within control limits
6. J- indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a low bias
7. J+ indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a high bias

Table 3-4
Summary of Historical Groundwater Analytical Detections
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Location				MW-02D, continued									MW-02S											
Date Sampled	Units	MCL	IL Class I GW Standard	9/1/1995	9/1/1995-DUP	4/8/2010	12/6/2010	12/6/2010-DUP	12/28/2011	7/17/2012	1/9/2013	7/24/2013	10/1/1993	10/1/1993-DUP	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	4/7/2010	12/7/2010	12/28/2011	7/17/2012	1/9/2013	7/24/2013
VOC																								
1,1,1-Trichloroethane	µg/L	200	200	<1 U	<1 U	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
1,1-Dichloroethane	µg/L	NS	700	<1 U	<1 U	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
1,1-Dichloroethene	µg/L	7	7	<1 U	<1 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<10 U	<10 U	<1 U	<1 U	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5
1,2-Dibromo-3-chloropropane	µg/L	0.2	0.2	<1 U	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	<1 U	<1 U	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
1,2-Dichloroethane	µg/L	5	5	<1 U	<1 U	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
1,2-Dichloroethene (Total)	µg/L	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10 U	**8 J**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	µg/L	5	5	<1 U	<1 U	<5 UJ	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5	<10 U	<10 U	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5
1,4-Dioxane	µg/L	NS	NS	NA	NA	<400 UJ	<400 UJ	<400 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<400 UJ	<400 UJ	NA	NA	NA	NA
Acetone	µg/L	NS	6300	NA	NA	<100 UJ	<100 UJ	<100 UJ	NA	NA	NA	NA	<10 UJ	<10 UJ	<10 U	<5 U	NA	NA	<100 UJ	<100 UJ	NA	NA	NA	NA
Benzene	µg/L	5	5	<1 U	<1 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<10 U	<10 U	<1 U	<1 U	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5
Bromomethane	µg/L	NS	9.8	<1 U	<1 U	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Carbon disulfide	µg/L	NS	700	<1 U	<1 U	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Chlorobenzene	µg/L	100	100	<1 U	<1 U	<5 U	<5 U	<5 U	NA	NA	NA	NA	<10 U	<10 U	<1 U	<1 U	<1 U	NA	<5 U	<5 U	NA	NA	NA	NA
Chloroethane	µg/L	NS	NS	<1 U	<1 U	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	<1 U	<1 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
Chloroform	µg/L	80	0.2	<1 U	<1 U	<1 UJ	<1 UJ	<1 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	<1 U	<1 U	NA	<1 UJ	<1 UJ	NA	NA	NA	NA
Chloromethane	µg/L	NS	NS	<1 U	<1 U	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	<1 U	<1 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
cis-1,2-Dichloroethene	µg/L	70	70	<1 U	<1 U	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Ethyl benzene	µg/L	700	700	<1 U	<1 U	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Methylene chloride	µg/L	5	5	<2 U	<2 U	<5 UJ	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5	<10 U	<10 U	<2 U	<2 U	<2 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5
Tetrachloroethene	µg/L	5	5	<1 U	<1 U	<5 UJ	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5	**6 J**	<10 U	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5
Toluene	µg/L	1000	1000	<1 U	<1 U	<5 U	<5 U	<5 U	NA	NA	NA	NA	<10 U	<1 U	<1 U	<1 U	<1 U	NA	<5 U	<5 U	NA	NA	NA	NA
trans-1,2-Dichloroethene	µg/L	100	100	<1 U	<1 U	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Trichloroethene	µg/L	5	5	<1 U	<1 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5	**1 J**	**3 J**	<1 U	<1 U	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5
Vinyl chloride	µg/L	2	2	<1 U	<1 U	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<10 U	<10 U	<1 U	<1 U	<1 U	NA	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ
Xylene, Total	µg/L	10000	10000	<1 U	<1 U	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
SVOC																								
2-Methylnaphthalene	µg/L	NS	NS	<10 U	<10 U	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	<10 U	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
2-Methylphenol	µg/L	NS	350	<10 U	<10 U	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	<10 U	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	µg/L	6	6	<10 U	<10 U	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	**1 J**	<10 U	<10 U	<10 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Diethylphthalate	µg/L	NS	5600	<10 U	<10 U	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	**2 J**	<10 U	<10 U	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
Di-n-butylphthalate	µg/L	NS	700	<10 U	<10 U	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	<10 U	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
Naphthalene	µg/L	NS	140	<10 U	<10 U	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	<10 U	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
Metals																								
Antimony	mg/L	0.006	0.006	<0.001 U	<0.001 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006	<0.0015 U	<0.0015 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006
Arsenic	mg/L	0.010	0.05	<0.003 U	<0.003 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 UJ	**0.002 J-**	**0.004**	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.003 U	<0.003 U	<0.002 U	<0.002 U	<0.002 U	<0.002 UJ	<0.002 UJ	<0.002
Barium	mg/L	2.0	2.0	**0.0728 B**	**0.0717 B**	**0.099**	**0.104**	**0.106**	NA	NA	NA	NA	**0.0684 J**	**0.0672 J**	**0.0573 B**	**0.0569 B**	**0.0572 B**	**0.0564 B**	**0.056**	**0.063**	NA	NA	NA	NA
Boron	mg/L	NS	2.0	**0.0173 B**	**0.0168 B**	<0.01 UJ	**0.03 J-**	**0.02 J-**	**0.02**	**0.02**	**0.02**	**0.02**	<0.1 U	<0.1 U	<0.1 U	<0.1 U	**0.0281 B**	NA	<0.01 UJ	**0.03 J-**	**0.04**	**0.04**	**0.03**	**0.02**
Chromium	mg/L	0.1	0.1	<0.001 U	<0.001 U	**0.008**	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	**0.002**	<0.003 U	<0.003 U	<0.002 U	<0.002 U	<0.001 U	<0.001 U	<0.001 U	**0.001**	**0.007**	**0.001**	**0.042**	**0.098**
Cobalt	mg/L	NS	1.0	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	NA	NA	NA	NA	<0.003 U	**0.005 J**	<0.003 U	<0.003 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	NA	NA	NA	NA
Copper	mg/L	1.3	0.65	<0.002 U	<0.002 U	<0.001 U	**0.002**	**0.004**	NA	NA	NA	NA	<0.0113 U	<0.007 U	<0.0028 U	<0.002 U	<0.001 U	<0.001 U	<0.001 U	**0.001**	NA	NA	NA	NA
Iron	mg/L	NS	5.0	**0.159**	**0.101**	**1.66 J**	**2.04**	**3.49**	**0.43**	**0.64**	**0.76**	**0.59**	**0.545**	**0.529**	**1.08**	**1.36**	<0.015 U	<0.015 U	**0.28 J**	**0.05**	**0.44**	**0.23**	**1.32**	**1.52**
Lead	mg/L	0.015	0.0075	<0.002 U	**0.0024 B**	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002	<0.001 U	<0.001 U	**0.0013 J**	**0.0014 J**	**0.0021 B**	**0.003**	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002
Manganese	mg/L	NS	0.15	**0.0542**	**0.0535**	**0.16**	**0.085**	**0.11**	**0.067**	**0.072**	**0.072**	**0.072**	**0.0465**	**0.0465**	**0.0494**	**0.0501**	**0.0478**	**0.0484**	**0.086**	**0.082**	**0.415**	**0.072**	**0.655**	**0.24**
Mercury	mg/L	0.002	0.002	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005
Nickel	mg/L	NS	0.1	**0.006 B**	**0.0068 B**	**0.008**	**0.01**	**0.01**	**0.007**	**0.008**	**0.006 J-**	**0.006**	<0.011 U	<0.011 U	**0.0089 B**	<0.008 U	**0.002 B**	**0.0026 B**	<0.001 U	**0.002**	**0.005**	**0.002**	**0.024 J-**	**0.01**
Zinc	mg/L	NS	5.0	**0.0137 B**	**0.0523**	**7.76**	**0.463**	**0.345**	NA	NA	NA	NA	**0.0236**	**0.0163 J**	**0.0156 B**	**0.0171 B**	**0.0164 B**	**0.0067 B**	**1.36**	<0.005 U	NA	NA	NA	NA
Inorganics																								
Cyanide	mg/L	0.2	0.2	<0.01 U	<0.01 U	<0.005 U	<0.005	<0.005 U	NA	NA	NA	NA	<0.01 U	<0.01 U	<0.01 U	<0.01 U	<0.01 U	NA	<0.005 U	<0.005 U	NA	NA	NA	NA
Sulfide	mg/L	NS	NS	<0.001 U	<0.001 U	<0.05 U	<0.05 U	<0.05 U	NA	NA	NA	NA	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	NA	<0.05 U	<0.05 U	NA	NA	NA	NA

Notes:
1. Bolded cells indicate detection
2. D=Deep
3. S=Shallow
4. NA=Not Analyzed
5. Units for VOCs and SVOCs are µg
6. Units for metals & inorganics are mg/L
7. Shaded cells indicate exceedance of MCL or Illinois Class I Groundwater Standard
8. NS=No Standard for MCL values or Illinois Class I Groundwater
9. R=Replacement
10. DUP=Duplicate Sample
11. MCLs can be found at http://www.epa.gov/safewater/contaminants/index.html
12. This table includes analytical results for parameters detected at any time at the Site. If a parameter was never detected it is not included.
13. The Illinois Class I Groundwater Standards are located in Section 620.410 of Title 35 of the Illinois Administrative Code

Data Qualifiers:
1. U indicates the analyte was analyzed for, but was not detected above the report sample quantitation limit
2. UJ indicates the analyte was not detected above the reported sample quantitation limit, however, the reported quantitation limit is approximate
3. J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
4. B indicates the analyte result was between IDL (instrument detection limit) and contract required detection limit
5. N indicates spiked sample recovery not within control limits
6. J- indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a low bias
7. J+ indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a high bias

Table 3-4
Summary of Historical Groundwater Analytical Detections
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Location				MW-03D													MW-03S				
Date Sampled	Units	MCL	IL Class I GW Standard	10/1/1993	10/1/1993-DUP	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	4/12/2010	12/8/2010	12/8/2010-DUP	12/27/2011	7/18/2012	1/9/2013	7/24/2013	10/1/1993	10/1/1993-DUP	12/1/1994	12/1/1994-DUP	9/1/1995
VOC																					
1,1,1-Trichloroethane	µg/L	200	200	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	**0.3 J**
1,1-Dichloroethane	µg/L	NS	700	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	**31**	NA	**22**
1,1-Dichloroethene	µg/L	7	7	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<10 U	<10 U	<10 U	NA	<1 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	0.2	NA	NA	<1 U	NA	NA	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA	NA
1,2-Dichloroethane	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	<1 U
1,2-Dichloroethene (Total)	µg/L	NS	NS	<10 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10 U	<10 U	NA	NA	NA
1,2-Dichloropropane	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5	<10 U	<10 U	<10 U	NA	<1 U
1,4-Dioxane	µg/L	NS	NS	NA	NA	NA	NA	NA	NA	<400 UJ	<400 UJ	<400 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	µg/L	NS	6300	<10 UJ	NA	**4 J**	NA	NA	NA	<100 UJ	<100 UJ	<100 UJ	NA	NA	NA	NA	**12 J**	<10 UJ	<50 U	NA	NA
Benzene	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<10 U	<10 U	<10 U	NA	**0.6 J**
Bromomethane	µg/L	NS	9.8	<10 U	NA	**0.1**	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	<1 U
Carbon disulfide	µg/L	NS	700	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	<1 U
Chlorobenzene	µg/L	100	100	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	<1 U
Chloroethane	µg/L	NS	NS	<10 U	NA	<1 U	NA	<1 U	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	**6 J**	NA	**2**
Chloroform	µg/L	80	0.2	<10 U	NA	<1 U	NA	<1 U	NA	<1 UJ	<1 UJ	<1 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	<1 U
Chloromethane	µg/L	NS	NS	<10 U	NA	**0.5 J**	NA	<1 U	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	**0.4 J**
cis-1,2-Dichloroethene	µg/L	70	70	NA	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	**2 J**	NA	**1**
Ethyl benzene	µg/L	700	700	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	<1 U
Methylene chloride	µg/L	5	5	<10 U	NA	<1 U	NA	<2 U	NA	<5 UJ	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5	**12**	**9 J**	<2 U	NA	<2 U
Tetrachloroethene	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5	<10 U	<10 U	<10 U	NA	<1 U
Toluene	µg/L	1000	1000	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	<1 U
trans-1,2-Dichloroethene	µg/L	100	100	NA	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA	<1 U
Trichloroethene	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<10 U	<10 U	<10 U	NA	**0.1 J**
Vinyl chloride	µg/L	2	2	<10 U	NA	<1 U	NA	<1 U	NA	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<10 U	<10 U	**2 J**	NA	**0.7 J**
Xylene, Total	µg/L	10000	10000	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	<1 U
SVOC																					
2-Methylnaphthalene	µg/L	NS	NS	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	<10 U
2-Methylphenol	µg/L	NS	350	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	<10 U
bis(2-Ethylhexyl) phthalate	µg/L	6	6	**2 J**	NA	<10 U	NA	<10 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	**2 J**
Diethylphthalate	µg/L	NS	5600	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	<10 U
Di-n-butylphthalate	µg/L	NS	700	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	**1 J**	NA	<10 U
Naphthalene	µg/L	NS	140	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	<10 U
Metals																					
Antimony	mg/L	0.006	0.006	<0.0015 U	**0.0033 B**	**0.0013 J**	<0.0044 U	<0.001 U	<0.001 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006	<0.0015 U	<0.0015 U	<0.001 U	<0.001 U	<0.001 U
Arsenic	mg/L	0.010	0.05	**0.0011 J**	<0.001 U	<0.001 U	<0.001 U	<0.003 U	<0.003 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 UJ	<0.002 UJ	<0.002	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.003 U
Barium	mg/L	2.0	2.0	**0.192 J**	**0.207**	**0.282**	**0.182**	**0.204**	**0.206**	**0.226**	**0.241**	**0.238**	NA	NA	NA	NA	**0.0509 J**	**0.0496 J**	**0.0936 B**	**0.0729 B**	**0.0543 B**
Boron	mg/L	NS	2.0	<0.1 U	<0.1 U	<0.1 U	<0.1 U	**0.0117 B**	NA	<0.01 UJ	**0.02 J-**	**0.02 J-**	**0.02**	**0.02**	**0.01**	<0.01	<0.1 U	<0.1 U	<0.1 U	<0.1 U	**0.0176 B**
Chromium	mg/L	0.1	0.1	<0.003 U	<0.003 U	**0.0047 B**	<0.002 U	<0.001 U	<0.001 U	<0.001 U	**0.002**	**0.002**	**0.001**	**0.001**	**0.009**	**0.016**	<0.003 U	<0.003 U	**0.0029 B**	<0.002 U	<0.001 U
Cobalt	mg/L	NS	1.0	**0.0042 J**	<0.003 U	<0.003 U	<0.003 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	NA	NA	NA	NA	**0.0037 J**	**0.0031 J**	<0.003 U	<0.003 U	<0.001 U
Copper	mg/L	1.3	0.65	<0.007 U	**0.0105 J**	<0.0022 U	<0.002 U	<0.002 U	<0.002 U	<0.001 U	<0.001 U	<0.001 U	NA	NA	NA	NA	<0.007 U	<0.007 U	<0.0084 U	<0.0057 U	<0.002 U
Iron	mg/L	NS	5.0	**3.48**	**1.64**	**4.52**	**1.42**	**1.62**	**1.56**	**2.19 J**	**1.79**	**1.77**	**1.75**	**2.45**	**3.77**	**2.08**	**0.117**	**0.129**	<0.0488 U	<0.0757 U	<0.015 U
Lead	mg/L	0.015	0.0075	<0.0014 U	**0.0037**	**0.0018 B**	<0.001 U	**0.0022 B**	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	**0.002**	<0.001 U	<0.0018 U	**0.0012 J**	<0.001 U	<0.002 U
Manganese	mg/L	NS	0.15	**0.0564**	**0.05**	**0.0673**	**0.0401**	**0.0475**	**0.0472**	**0.078**	**0.049**	**0.049**	**0.053**	**0.065**	**0.221**	**0.199**	**0.0986**	**0.0998**	**0.222**	**0.184**	**0.0986**
Mercury	mg/L	0.002	0.002	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U
Nickel	mg/L	NS	0.1	<0.011 U	<0.011 U	**0.0105 B**	<0.008 U	**0.0034 B**	**0.0019 B**	**0.024**	**0.023**	**0.022**	**0.011**	**0.013**	**0.095 J-**	**0.135**	<0.011 U	<0.011 U	**0.0195 B**	<0.0151 U	**0.0079 B**
Zinc	mg/L	NS	5.0	**0.0156 J**	**0.0112 J**	**0.058**	<0.0182 U	**0.0092 B**	**0.0072 B**	**1.03**	**0.034**	**0.034**	NA	NA	NA	NA	**0.0095 J**	**0.0095 J**	**0.0235**	<0.0308 U	**0.006 B**
Inorganics																					
Cyanide	mg/L	0.2	0.2	<0.01 U	NA	<0.01 U	NA	<0.01 U	NA	<0.005 U	<0.005 U	<0.005 U	NA	NA	NA	NA	<0.01 U	<0.01 U	<0.01 U	NA	<0.01 U
Sulfide	mg/L	NS	NS	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.05 U	<0.05 U	<0.05 U	NA	NA	NA	NA	<0.001 U	<0.001 U	<0.001 U	NA	<0.001 U

Notes:
1. Bolded cells indicate detection
2. D=Deep
3. S=Shallow
4. NA=Not Analyzed
5. Units for VOCs and SVOCs are µg/L
6. Units for metals & inorganics are mg/L
7. Shaded cells indicate exceedance of MCL or Illinois Class I Groundwater Standard
8. NS=No Standard for MCL values or Illinois Class I Groundwater
9. R=Replacement
10. DUP=Duplicate Sample
11. MCLs can be found at http://www.epa.gov/safewater/contaminants/index.html
12. This table includes analytical results for parameters detected at any time at the Site. If a parameter was never detected it is not included.
13. The Illinois Class I Groundwater Standards are located in Section 620.410 of Title 35 of the Illinois Administrative Code

Data Qualifiers:
1. U indicates the analyte was analyzed for, but was not detected above the report sample quantitation limit
2. UJ indicates the analyte was not detected above the reported sample quantitation limit, however, the reported quantitation limit is approximate
3. J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
4. B indicates the analyte result was between IDL (instrument detection limit) and contract required detection limit
5. N indicates spiked sample recovery not within control limits
6. J- indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a low bias
7. J+ indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a high bias

Table 3-4
Summary of Historical Groundwater Analytical Detections
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Location				MW-03S									MW-04D							
Date Sampled	Units	MCL	IL Class I GW Standard	9/1/1995-DUP	2/1/2000	11/1/2006	4/12/2010	12/7/2010	12/27/2011	7/18/2012	1/9/2013	7/23/2013	11/1/1993	11/1/1993-DUP	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	4/7/2010	12/7/2010
VOC																				
1,1,1-Trichloroethane	µg/L	200	200	NA	<1 U	<5 U	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
1,1-Dichloroethane	µg/L	NS	700	NA	**46**	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
1,1-Dichloroethene	µg/L	7	7	NA	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	0.2	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	<1 U	NA	NA	NA	<10 UJ	<10 UJ
1,2-Dichloroethane	µg/L	5	5	NA	**2**	<5 U	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<2 U	NA	<5 UJ	<5 UJ
1,2-Dichloroethene (Total)	µg/L	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10 U	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	µg/L	5	5	NA	<1 U	<5 U	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
1,4-Dioxane	µg/L	NS	NS	NA	NA	NA	<400 UJ	<400 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<400 UJ	<400 UJ
Acetone	µg/L	NS	6300	NA	NA	NA	<100 UJ	<100 UJ	NA	NA	NA	NA	<10 UJ	NA	<5 U	NA	NA	NA	<100 UJ	<100 UJ
Benzene	µg/L	5	5	NA	**4**	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U
Bromomethane	µg/L	NS	9.8	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
Carbon disulfide	µg/L	NS	700	NA	<5 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
Chlorobenzene	µg/L	100	100	NA	<1 U	NA	<5 U	<5 U	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U
Chloroethane	µg/L	NS	NS	NA	**4**	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 UJ	<10 UJ
Chloroform	µg/L	80	0.2	NA	<1 U	NA	<1 UJ	<1 UJ	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<1 UJ	<1 UJ
Chloromethane	µg/L	NS	NS	NA	<1 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	NA	<1 U	NA	**0.6 J**	NA	<10 UJ	<10 UJ
cis-1,2-Dichloroethene	µg/L	70	70	NA	**8**	<5 U	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
Ethyl benzene	µg/L	700	700	NA	<1 U	<5 U	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
Methylene chloride	µg/L	5	5	NA	<2 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5	<10 U	NA	<2 U	NA	<2 U	NA	<5 UJ	<5 UJ
Tetrachloroethene	µg/L	5	5	NA	<1 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
Toluene	µg/L	1000	1000	NA	<1 U	<5 U	<5 U	<5 U	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U
trans-1,2-Dichloroethene	µg/L	100	100	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
Trichloroethene	µg/L	5	5	NA	**4**	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U
Vinyl chloride	µg/L	2	2	NA	**6**	<2 U	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<2 UJ	<2 UJ
Xylene, Total	µg/L	10000	10000	NA	<1 U	<5 U	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
SVOC																				
2-Methylnaphthalene	µg/L	NS	NS	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ
2-Methylphenol	µg/L	NS	350	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ
bis(2-Ethylhexyl) phthalate	µg/L	6	6	NA	NA	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	NA	<10 U	NA	<10 U	NA	<5 UJ	<5 UJ
Diethylphthalate	µg/L	NS	5600	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ
Di-n-butylphthalate	µg/L	NS	700	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ
Naphthalene	µg/L	NS	140	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ
Metals																				
Antimony	mg/L	0.006	0.006	<0.001 U	NA	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006	<0.0015 U	**0.0034 J**	<0.001 U	<0.0025 U	<0.001 U	<0.001 U	<0.006 U	<0.006 U
Arsenic	mg/L	0.010	0.05	<0.003 U	NA	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 UJ	**0.003 J-**	**0.007**	**0.0028 J**	<0.001 U	<0.001 U	<0.001 U	<0.003 U	<0.003 U	<0.002 U	<0.002 U
Barium	mg/L	2.0	2.0	**0.0538 B**	NA	NA	**0.081**	**0.083**	NA	NA	NA	NA	**0.0999 J**	**0.101 J**	**0.11 B**	**0.104 B**	**0.118 B**	**0.105 B**	**0.153**	**0.163**
Boron	mg/L	NS	2.0	NA	NA	**0.06**	**0.03 J**	**0.02 J-**	**0.04**	**0.03**	**0.04**	**0.03**	<0.1 U	<0.1 U	<0.1 U	<0.1 U	**0.023 B**	NA	<0.01 UJ	**0.03 J-**
Chromium	mg/L	0.1	0.1	<0.001 U	NA	**0.005**	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001	<0.003 U	<0.003 U	<0.002 U	<0.007 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U
Cobalt	mg/L	NS	1.0	<0.001 U	NA	NA	**0.007**	**0.006**	NA	NA	NA	NA	**0.0037 J**	<0.003 U	<0.003 U	<0.003 U	<0.001 U	<0.001 U	<0.001 U	**0.002**
Copper	mg/L	1.3	0.65	<0.002 U	NA	NA	<0.001 U	**0.001**	NA	NA	NA	NA	<0.007 U	<0.007 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.001 U	<0.001 U
Iron	mg/L	NS	5.0	<0.015 U	NA	**0.61**	**1.3 J**	**1.12**	**1.22**	**1.53**	**2.33**	**3.63**	**0.461**	**0.317**	<0.214 U	<0.035 U	**1.38**	**1.07**	**0.24 J**	**1.79**
Lead	mg/L	0.015	0.0075	**0.0021 B**	NA	**0.002**	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002	<0.0011 U	<0.001 U	<0.001 U	<0.001 U	**0.0024 B**	<0.002 U	<0.002 U	<0.002 U
Manganese	mg/L	NS	0.15	**0.112**	NA	**2.77**	**1.16**	**1.14**	**1.22**	**1.24**	**1.45**	**1.58**	**0.159**	**0.173**	**0.231**	**0.224**	**0.235**	**0.212**	**0.196**	**0.234**
Mercury	mg/L	0.002	0.002	<0.0002 U	NA	<0.0005 U	<0.0002 U	<0.0002 U	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U
Nickel	mg/L	NS	0.1	**0.009 B**	NA	**0.079**	**0.01**	**0.014**	**0.016**	**0.014**	**0.018 J-**	**0.023**	<0.011 U	<0.011 U	**0.0147 B**	<0.008 U	**0.0034 B**	**0.0032 B**	<0.001 U	**0.005**
Zinc	mg/L	NS	5.0	**0.009 B**	NA	NA	**1.34**	**0.14**	NA	NA	NA	NA	**0.0048 J**	**0.0094 J**	**0.0546**	<0.0162 U	**0.0074 B**	**0.0055 B**	<0.005 U	**0.378**
Inorganics																				
Cyanide	mg/L	0.2	0.2	NA	NA	NA	<0.005 U	<0.005 U	NA	NA	NA	NA	<0.01 U	NA	<0.01 U	NA	<0.01 U	NA	<0.005 U	<0.005 U
Sulfide	mg/L	NS	NS	NA	NA	NA	<0.05 U	<0.05 U	NA	NA	NA	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.05 U	<0.05 U

Notes:
1. Bolded cells indicate detection
2. D=Deep
3. S=Shallow
4. NA=Not Analyzed
5. Units for VOCs and SVOCs are µg/L
6. Units for metals & inorganics are mg/L
7. Shaded cells indicate exceedance of MCL or Illinois Class I Groundwater Standard
8. NS=No Standard for MCL values or Illinois Class I Groundwater
9. R=Replacement
10. DUP=Duplicate Sample
11. MCLs can be found at http://www.epa.gov/safewater/contaminants/index.html
12. This table includes analytical results for parameters detected at any time at the Site. If a parameter was never detected it is not included.
13. The Illinois Class I Groundwater Standards are located in Section 620.410 of Title 35 of the Illinois Administrative Code

Data Qualifiers:
1. U indicates the analyte was analyzed for, but was not detected above the report sample quantitation limit
2. UJ indicates the analyte was not detected above the reported sample quantitation limit, however, the reported quantitation limit is approximate
3. J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
4. B indicates the analyte result was between IDL (instrument detection limit) and contract required detection limit
5. N indicates spiked sample recovery not within control limits
6. J- indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a low bias
7. J+ indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a high bias

Table 3-4
Summary of Historical Groundwater Analytical Detections
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Location				MW-04S								MW-05D									
Date Sampled	Units	MCL	IL Class I GW Standard	11/1/1993	11/1/1993-DUP	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	4/6/2010	12/7/2010	11/1/1993	11/1/1993-DUP	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	4/14/2010	4/14/2010-DUP	12/2/2010
VOC																					
1,1,1-Trichloroethane	µg/L	200	200	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ
1,1-Dichloroethane	µg/L	NS	700	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<10 U	NA	**0.3 J**	NA	**0.2 J**	NA	<5 UJ	<5 UJ	<5 UJ
1,1-Dichloroethene	µg/L	7	7	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	0.2	NA	NA	<1 U	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	<1 U	NA	NA	NA	<10 UJ	<10 UJ	<10 UJ
1,2-Dichloroethane	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ
1,2-Dichloroethene (Total)	µg/L	NS	NS	<10 U	NA	NA	NA	NA	NA	NA	NA	<10 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ
1,4-Dioxane	µg/L	NS	NS	NA	NA	NA	NA	NA	NA	<400 UJ	<400 UJ	NA	NA	NA	NA	NA	NA	<400 UJ	<400 UJ	<400 UJ
Acetone	µg/L	NS	6300	<10 UJ	NA	<5 U	NA	NA	NA	<100 UJ	<100 UJ	<10 UJ	NA	NA	NA	NA	NA	<100 UJ	<100 UJ	<100 UJ
Benzene	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<10 U	NA	**0.4 J**	NA	**0.4 J**	NA	<5 U	<5 U	<5 U
Bromomethane	µg/L	NS	9.8	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ
Carbon disulfide	µg/L	NS	700	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ
Chlorobenzene	µg/L	100	100	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U
Chloroethane	µg/L	NS	NS	<10 U	NA	<1 U	NA	<1 U	NA	<10 UJ	<10 UJ	<10 U	NA	**0.6 J**	NA	**0.5 J**	NA	<10 UJ	<10 UJ	<10 UJ
Chloroform	µg/L	80	0.2	<10 U	NA	<1 U	NA	<1 U	NA	<1 UJ	<1 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<1 UJ	<1 UJ	<1 UJ
Chloromethane	µg/L	NS	NS	<10 U	NA	<1 U	NA	**0.2 J**	NA	<10 UJ	<10 UJ	<10 U	NA	**0.2 J**	NA	<1 U	NA	<10 UJ	<10 UJ	<10 UJ
cis-1,2-Dichloroethene	µg/L	70	70	NA	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ
Ethyl benzene	µg/L	700	700	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ
Methylene chloride	µg/L	5	5	<10 U	NA	<2 U	NA	<2 U	NA	<5 UJ	<5 UJ	<10 U	NA	<1 U	NA	<2 U	NA	<5 UJ	<5 UJ	<5 UJ
Tetrachloroethene	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ
Toluene	µg/L	1000	1000	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U
trans-1,2-Dichloroethene	µg/L	100	100	NA	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ
Trichloroethene	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U
Vinyl chloride	µg/L	2	2	<10 U	NA	<1 U	NA	<1 U	NA	<2 UJ	<2 UJ	<10 U	NA	<1 U	NA	**0.1 J**	NA	<2 UJ	<2 UJ	<2 UJ
Xylene, Total	µg/L	10000	10000	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ
SVOC																					
2-Methylnaphthalene	µg/L	NS	NS	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ
2-Methylphenol	µg/L	NS	350	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ
bis(2-Ethylhexyl) phthalate	µg/L	6	6	<10 U	NA	<10 U	NA	<10 U	NA	<5 UJ	<5 UJ	**1 J**	NA	<10 U	NA	<10 U	NA	<5 UJ	<5 UJ	<5 UJ
Diethylphthalate	µg/L	NS	5600	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	**5 J**	NA	**1 J**	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ
Di-n-butylphthalate	µg/L	NS	700	**4 J**	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ
Naphthalene	µg/L	NS	140	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ
Metals																					
Antimony	mg/L	0.006	0.006	<0.0015 U	<0.0015 U	<0.001 U	<0.0022 U	<0.001 U	<0.001 UJ	<0.006 U	<0.006 U	<0.0015 U	**0.002 J**	<0.001 U	<0.005 U	<0.001 U	<0.001 U	<0.006 U	<0.006 U	<0.006 U
Arsenic	mg/L	0.010	0.05	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.003 U	<0.003 U	<0.002 U	<0.002 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.003 U	<0.003 U	<0.002 U	<0.002 U	<0.002 U
Barium	mg/L	2.0	2.0	**0.077 J**	**0.0616 J**	**0.0812 B**	**0.0764 B**	**0.0786 B**	**0.0762 B**	**0.064**	**0.074**	**0.557**	**0.519**	**1.03**	**0.986**	**0.914**	**0.916**	**0.931**	**0.874**	**0.856**
Boron	mg/L	NS	2.0	<0.1 U	<0.1 U	<0.1 U	<0.1 U	**0.0232 B**	NA	<0.01 UJ	**0.02 J-**	<0.1 U	<0.1 U	**0.723**	**0.708**	**0.864**	NA	**0.5 J**	**0.5 J**	**0.35 J-**
Chromium	mg/L	0.1	0.1	<0.003 U	<0.003 U	<0.002 U	<0.002 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.0079 U	<0.003 U	<0.002 U	<0.002 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U
Cobalt	mg/L	NS	1.0	<0.003 U	<0.003 U	<0.003 U	<0.003 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.003 U	<0.003 U	<0.003 U	<0.003 U	**0.0045 B**	**0.0047 B**	<0.001 U	<0.001 U	<0.001 U
Copper	mg/L	1.3	0.65	<0.0088 U	<0.007 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.001 U	**0.002**	**0.0248 J**	<0.007 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.001 U	<0.001 U	<0.001 U
Iron	mg/L	NS	5.0	<0.087 U	<0.087 U	**0.37**	<0.015 U	<0.015 U	<0.015 U	<0.01 UJ	**0.91**	**3.08**	**0.399**	**1.47**	**1.34**	**1.11**	**1.17**	**1.33 J**	**1.23 J**	**1.66**
Lead	mg/L	0.015	0.0075	<0.002 U	**0.0047**	**0.0021 J**	<0.0012 U	**0.0021 B**	**0.0028 B**	<0.002 U	<0.002 U	**0.0045**	<0.002 U	<0.002 U	<0.001 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U
Manganese	mg/L	NS	0.15	<0.002 U	<0.002 U	**0.0118 B**	**0.0023 B**	<0.001 U	<0.002 U	< 0.001 U	**0.056**	**0.179**	**0.108**	**0.0955**	**0.085**	**0.0453**	**0.0516**	**0.034**	**0.029**	**0.048**
Mercury	mg/L	0.002	0.002	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U
Nickel	mg/L	NS	0.1	<0.011 U	<0.011 U	<0.008 U	<0.008 U	**0.0168 B**	**0.0015 B**	<0.001 U	**0.003**	**0.02 J**	**0.0244 J**	**0.0443**	<0.0344 U	**0.0441**	**0.0429**	**0.027**	**0.027**	**0.018**
Zinc	mg/L	NS	5.0	<0.0164 U	<0.0046 U	**0.0223**	<0.0152 U	**0.0101 B**	**0.0043 B**	<0.005 U	**0.025**	**0.0454**	<0.0134 U	**0.0354**	<0.0282 U	**0.0112 B**	**0.0057 B**	<0.005 U	<0.005 U	<0.005 U
Inorganics																					
Cyanide	mg/L	0.2	0.2	<0.01 U	NA	<0.01 U	NA	<0.01 U	NA	<0.005 U	<0.005 U	<0.01 U	NA	<0.01 U	NA	<0.01 U	NA	<0.005 U	<0.005 U	<0.005 U
Sulfide	mg/L	NS	NS	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.05 U	<0.05 U	**0.0012**	NA	<0.001 U	NA	<0.001 U	NA	**0.09**	**0.08**	**0.05**

Notes:
1. Bolded cells indicate detection
2. D=Deep
3. S=Shallow
4. NA=Not Analyzed
5. Units for VOCs and SVOCs are µg/L
6. Units for metals & inorganics are mg/L
7. Shaded cells indicate exceedance of MCL or Illinois Class I Groundwater Standard
8. NS=No Standard for MCL values or Illinois Class I Groundwater
9. R=Replacement
10. DUP=Duplicate Sample
11. MCLs can be found at http://www.epa.gov/safewater/contaminants/index.html
12. This table includes analytical results for parameters detected at any time at the Site. If a parameter was never detected it is not included.
13. The Illinois Class I Groundwater Standards are located in Section 620.410 of Title 35 of the Illinois Administrative Code

Data Qualifiers:
1. U indicates the analyte was analyzed for, but was not detected above the report sample quantitation limit
2. UJ indicates the analyte was not detected above the reported sample quantitation limit, however, the reported quantitation limit is approximate
3. J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
4. B indicates the analyte result was between IDL (instrument detection limit) and contract required detection limit
5. N indicates spiked sample recovery not within control limits
6. J- indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a low bias
7. J+ indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a high bias

Table 3-4
Summary of Historical Groundwater Analytical Detections
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Location				MW-05S								MW-06D								
Date Sampled	Units	MCL	IL Class I GW Standard	11/1/1993	11/1/1993-DUP	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	4/13/2010	12/2/2010	10/1/1993	11/1/1993	11/1/1993-DUP	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	4/14/2010	12/3/2010
VOC																				
1,1,1-Trichloroethane	µg/L	200	200	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
1,1-Dichloroethane	µg/L	NS	700	<10 U	NA	**2**	NA	**3**	NA	<5 UJ	<5 UJ	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
1,1-Dichloroethene	µg/L	7	7	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	0.2	NA	NA	NA	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	<1 U	NA	NA	NA	<10 UJ	<10 UJ
1,2-Dichloroethane	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
1,2-Dichloroethene (Total)	µg/L	NS	NS	<10 U	NA	NA	NA	NA	NA	NA	NA	NA	<10 U	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	µg/L	5	5	<10 U	NA	**0.1 J**	NA	<1 U	NA	<5 UJ	<5 UJ	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
1,4-Dioxane	µg/L	NS	NS	NA	NA	NA	NA	NA	NA	<400 UJ	<400 UJ	NA	NA	NA	NA	NA	NA	NA	<400 UJ	<400 UJ
Acetone	µg/L	NS	6300	<10 UJ	NA	NA	NA	NA	NA	<100 UJ	<100 UJ	NA	<10 UJ	NA	<5 U	NA	NA	NA	<100 UJ	<100 UJ
Benzene	µg/L	5	5	<10 U	NA	<1 U	NA	**0.1 J**	NA	<5 U	<5 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U
Bromomethane	µg/L	NS	9.8	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
Carbon disulfide	µg/L	NS	700	<10 U	NA	<1 U	NA	**0.1 J**	NA	<5 UJ	<5 UJ	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
Chlorobenzene	µg/L	100	100	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U
Chloroethane	µg/L	NS	NS	<10 U	NA	**2**	NA	**4**	NA	<10 UJ	<10 UJ	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 UJ	<10 UJ
Chloroform	µg/L	80	0.2	<10 U	NA	<1 U	NA	<1 U	NA	<1 UJ	<1 UJ	NA	<10 U	NA	<1 U	NA	<1 U	NA	<1 UJ	<1 UJ
Chloromethane	µg/L	NS	NS	<10 U	NA	<1 U	NA	**0.2 J**	NA	<10 UJ	<10 UJ	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 UJ	<10 UJ
cis-1,2-Dichloroethene	µg/L	70	70	NA	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
Ethyl benzene	µg/L	700	700	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
Methylene chloride	µg/L	5	5	<10 U	NA	<1 U	NA	<2 U	NA	<5 UJ	<5 UJ	NA	<10 U	NA	<2 U	NA	<2 U	NA	<5 UJ	<5 UJ
Tetrachloroethene	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
Toluene	µg/L	1000	1000	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U
trans-1,2-Dichloroethene	µg/L	100	100	NA	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
Trichloroethene	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U
Vinyl chloride	µg/L	2	2	<10 U	NA	**0.2 J**	NA	**0.5 J**	NA	<2 UJ	<2 UJ	NA	<10 U	NA	<1 U	NA	<1 U	NA	<2 UJ	<2 UJ
Xylene, Total	µg/L	10000	10000	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ
SVOC																				
2-Methylnaphthalene	µg/L	NS	NS	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 U	NA	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ
2-Methylphenol	µg/L	NS	350	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 U	NA	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ
bis(2-Ethylhexyl) phthalate	µg/L	6	6	<10 U	NA	<10 U	NA	<10 U	NA	<5 UJ	<5 UJ	<10 U	NA	NA	<10 U	NA	**27**	NA	<5 UJ	<5 UJ
Diethylphthalate	µg/L	NS	5600	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 U	NA	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ
Di-n-butylphthalate	µg/L	NS	700	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 U	NA	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ
Naphthalene	µg/L	NS	140	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 U	NA	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ
Metals																				
Antimony	mg/L	0.006	0.006	<0.0015 U	**0.0024 J**	<0.001 U	<0.0058 U	<0.001 U	<0.001 U	<0.006 U	<0.006 U	NA	<0.0015 U	<0.0015 U	<0.001 U	<0.0018 U	<0.001 U	<0.001 U	<0.006 U	<0.006 U
Arsenic	mg/L	0.010	0.05	**0.0034 J**	**0.0034 J**	**0.0048 B**	**0.005 B**	<0.003 U	**0.0046 B**	<0.002 U	<0.002 U	NA	**0.0021 J**	**0.0016 J**	<0.001 U	<0.001 U	<0.003 U	<0.003 U	<0.002 U	<0.002 U
Barium	mg/L	2.0	2.0	**0.185 J**	**0.185 J**	**0.181 B**	**0.181 B**	**0.143 B**	**0.148 B**	**0.202**	**0.13**	NA	**0.145 J**	**0.148 J**	**0.187 B**	**0.148 B**	**0.223**	**0.188 B**	**0.196**	**0.194**
Boron	mg/L	NS	2.0	<0.1 U	<0.1 U	<0.1 U	<0.1 U	**0.0213 B**	NA	**1.28 J**	**1.04 J-**	NA	<0.1 U	<0.1 U	<0.1 U	<0.1 U	**0.0146 B**	NA	**0.05 J**	**0.07 J-**
Chromium	mg/L	0.1	0.1	<0.003 U	<0.003 U	<0.002 U	<0.002 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	NA	<0.003 U	<0.003 U	<0.002 U	<0.002 U	**0.004 B**	<0.003 U	**0.042**	**0.002**
Cobalt	mg/L	NS	1.0	<0.003 U	<0.003 U	<0.003 U	<0.003 U	**0.0024 B**	**0.0032 B**	<0.001 U	**0.001**	NA	**0.003 J**	<0.003 U	<0.003 U	<0.003 U	<0.003 U	<0.003 U	**0.006**	**0.004**
Copper	mg/L	1.3	0.65	<0.0154 U	<0.007 U	<0.002 U	<0.002 U	<0.001 U	<0.001 U	<0.001 U	**0.001**	NA	<0.0131 U	**0.0498**	<0.002 U	<0.002 U	<0.006 U	<0.006 U	**0.005**	**0.002**
Iron	mg/L	NS	5.0	**1.01**	**0.849**	**1.48**	**1.14**	**2.75**	**2.93**	**0.26 J**	**3.25**	NA	**0.802**	**0.303**	**1.69**	<0.171 U	**0.812**	**0.199**	**0.69 J**	**0.33**
Lead	mg/L	0.015	0.0075	<0.002 U	<0.002 U	<0.002 U	<0.001 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	NA	<0.0017 U	<0.001 U	**0.0053 J**	<0.0012 U	**0.0063**	<0.0024 U	<0.002 U	<0.002 U
Manganese	mg/L	NS	0.15	**0.253**	**0.226**	**0.255**	**0.262**	**0.299**	**0.373**	**0.098**	**0.146**	NA	**0.13**	**0.131**	**0.12**	**0.0857**	**0.0563**	**0.0361**	**0.147**	**0.094**
Mercury	mg/L	0.002	0.002	<0.0002 U	**0.0052**	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	NA	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U
Nickel	mg/L	NS	0.1	**0.0369 J**	**0.0303 J**	**0.0214 J**	<0.0223 U	**0.0515**	**0.0583**	**0.074**	**0.064**	NA	<0.011 U	<0.011 U	<0.008 U	<0.008 U	<0.007 U	<0.007 U	**0.394**	**0.269**
Zinc	mg/L	NS	5.0	<0.0224 U	<0.0114 U	**0.0452**	<0.0244 U	**0.0131 B**	**0.008 B**	<0.005 U	<0.005 U	NA	**0.026**	**0.0175 J**	**0.052**	<0.0248 U	**0.0243**	**0.0546 J**	<0.005 U	**0.016**
Inorganics																				
Cyanide	mg/L	0.2	0.2	<0.01 U	NA	<0.01 U	NA	<0.01 U	NA	<0.005 U	<0.005 U	NA	<0.01 U	NA	<0.01 U	NA	<0.01 U	NA	<0.005 U	<0.005 U
Sulfide	mg/L	NS	NS	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.05 U	<0.05 U	NA	<0.001 U	NA	**0.0025**	NA	<0.001 U	NA	<0.05 U	<0.05 U

Notes:
1. Bolded cells indicate detection
2. D=Deep
3. S=Shallow
4. NA=Not Analyzed
5. Units for VOCs and SVOCs are µg/L
6. Units for metals & inorganics are mg/L
7. Shaded cells indicate exceedance of MCL or Illinois Class I Groundwater Standard
8. NS=No Standard for MCL values or Illinois Class I Groundwater
9. R=Replacement
10. DUP=Duplicate Sample
11. MCLs can be found at http://www.epa.gov/safewater/contaminants/index.html
12. This table includes analytical results for parameters detected at any time at the Site. If a parameter was never detected it is not included.
13. The Illinois Class I Groundwater Standards are located in Section 620.410 of Title 35 of the Illinois Administrative Code

Data Qualifiers:
1. U indicates the analyte was analyzed for, but was not detected above the report sample quantitation limit
2. UJ indicates the analyte was not detected above the reported sample quantitation limit, however, the reported quantitation limit is approximate
3. J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
4. B indicates the analyte result was between IDL (instrument detection limit) and contract required detection limit
5. N indicates spiked sample recovery not within control limits
6. J- indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a low bias
7. J+ indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a high bias

Table 3-4
Summary of Historical Groundwater Analytical Detections
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Location				MW-06S														MW-07D		
Date Sampled	Units	MCL	IL Class I GW Standard	10/1/1993	11/1/1993	11/1/1993-DUP	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	4/13/2010	12/3/2010	12/27/2011	7/17/2012	7/17/2012-DUP	1/9/2013	7/23/2013	10/1/1993	11/1/1993	11/1/1993-DUP
VOC																				
1,1,1-Trichloroethane	µg/L	200	200	NA	<10 U	NA	<5 U	NA	<5 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA
1,1-Dichloroethane	µg/L	NS	700	NA	**56**	NA	**55**	NA	**56**	NA	**16.3 J**	**20.4**	NA	NA	NA	NA	NA	NA	<10 U	NA
1,1-Dichloroethene	µg/L	7	7	NA	<10 U	NA	<5 U	NA	<5 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5	NA	<10 U	NA
1,2-Dibromo-3-chloropropane	µg/L	0.2	0.2	NA	NA	NA	<5 U	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	µg/L	5	5	NA	<10 U	NA	<5 U	NA	<5 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA
1,2-Dichloroethene (Total)	µg/L	NS	NS	NA	**1 J**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10 U	NA
1,2-Dichloropropane	µg/L	5	5	NA	<10 U	NA	<5 U	NA	<5 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5	NA	<10 U	NA
1,4-Dioxane	µg/L	NS	NS	NA	NA	NA	NA	NA	NA	NA	<400 UJ	<400 UJ	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	µg/L	NS	6300	NA	<10 UJ	NA	<25 U	NA	NA	NA	<100 UJ	<100 UJ	NA	NA	NA	NA	NA	NA	<10 UJ	NA
Benzene	µg/L	5	5	NA	**4**	NA	**5**	NA	**6 J**	NA	**7.6**	**7.7**	**7.6**	**8.9**	**8.8**	**7.5**	**6.9**	NA	<10 U	NA
Bromomethane	µg/L	NS	9.8	NA	<10 U	NA	<5 U	NA	<5 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA
Carbon disulfide	µg/L	NS	700	NA	<10 U	NA	<5 U	NA	<5 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA
Chlorobenzene	µg/L	100	100	NA	<10 U	NA	<5 U	NA	<5 U	NA	<5 U	<5 U	NA	NA	NA	NA	NA	NA	<10 U	NA
Chloroethane	µg/L	NS	NS	NA	**5 J**	NA	**9**	NA	**12**	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	**13**	NA
Chloroform	µg/L	80	0.2	NA	<10 U	NA	**6**	NA	**10**	NA	<1 UJ	<1 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA
Chloromethane	µg/L	NS	NS	NA	<10 U	NA	<5 U	NA	<5 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA
cis-1,2-Dichloroethene	µg/L	70	70	NA	NA	NA	**2 J**	NA	**2 J**	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl benzene	µg/L	700	700	NA	<10 U	NA	<5 U	NA	<5 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA
Methylene chloride	µg/L	5	5	NA	<10 U	NA	<2 U	NA	<10 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5	NA	<10 U	NA
Tetrachloroethene	µg/L	5	5	NA	<10 U	NA	<5 U	NA	<5 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5	NA	<10 U	NA
Toluene	µg/L	1000	1000	NA	<10 U	NA	<5 U	NA	<5 U	NA	<5 U	<5 U	NA	NA	NA	NA	NA	NA	<10 U	NA
trans-1,2-Dichloroethene	µg/L	100	100	NA	NA	NA	**0.6 J**	NA	**0.6 J**	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	µg/L	5	5	NA	**1 J**	NA	**2 J**	NA	**2 J**	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5	NA	<10 U	NA
Vinyl chloride	µg/L	2	2	NA	<10 U	NA	**2 J**	NA	**2 J**	NA	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	NA	<10 U	NA
Xylene, Total	µg/L	10000	10000	NA	<10 U	NA	<5 U	NA	<5 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA
SVOC																				
2-Methylnaphthalene	µg/L	NS	NS	<10 U	NA	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	<10 U	NA	NA
2-Methylphenol	µg/L	NS	350	<10 U	NA	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	<10 U	NA	NA
bis(2-Ethylhexyl) phthalate	µg/L	6	6	<10 U	NA	NA	<10 U	NA	**3 J**	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	<10 U	NA	NA
Diethylphthalate	µg/L	NS	5600	<10 U	NA	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	<10 U	NA	NA
Di-n-butylphthalate	µg/L	NS	700	<10 U	NA	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	<10 U	NA	NA
Naphthalene	µg/L	NS	140	<10 U	NA	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	<10 U	NA	NA
Metals																				
Antimony	mg/L	0.006	0.006	NA	<0.0015 U	**0.0034**	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006	NA	<0.0015 U	**0.0029**
Arsenic	mg/L	0.010	0.05	NA	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.003 U	<0.003 U	<0.002 U	**0.006**	**0.007**	**0.009 J**	**0.008 J**	**0.009**	**0.007**	NA	**0.005 J**	**0.0014 J**
Barium	mg/L	2.0	2.0	NA	**0.0867 J**	**0.089 J**	**0.0932 B**	**0.0904 B**	**0.124 B**	**0.118 B**	**0.687**	**0.802**	NA	NA	NA	NA	NA	NA	**0.155 J**	**0.145 J**
Boron	mg/L	NS	2.0	NA	<0.1 U	<0.1 U	<0.1 U	<0.1 U	**0.0091 B**	NA	**3.6 J**	**3.28 J-**	**2.96**	**3.56**	**3.25**	**3.08**	**3.10**	NA	<0.1 U	<0.1 U
Chromium	mg/L	0.1	0.1	NA	<0.003 U	<0.003 U	<0.002 U	<0.002 U	<0.003 U	<0.003 U	<0.001 U	**0.008**	**0.003**	**0.005**	**0.009**	**0.002**	**0.005**	NA	<0.003 U	<0.003 U
Cobalt	mg/L	NS	1.0	NA	**0.0069 J**	<0.003 U	<0.003 U	<0.003 U	<0.003 U	<0.003 U	**0.02**	**0.022**	NA	NA	NA	NA	NA	NA	**0.0056 J**	<0.003 U
Copper	mg/L	1.3	0.65	NA	<0.0152 U	**0.0568**	<0.0043 U	<0.002 U	<0.006 U	<0.006 U	<0.001 U	**0.003**	NA	NA	NA	NA	NA	NA	<0.007 U	**0.0082 J**
Iron	mg/L	NS	5.0	NA	**0.214**	**0.0893**	**1.08**	**0.905**	**1.23**	**1.09**	**2.81 J**	**4.02**	**2.62**	**2.93**	**2.76**	**2.46**	**2.75**	NA	**2.11**	**1.65**
Lead	mg/L	0.015	0.0075	NA	<0.001 U	<0.001 U	**0.0022**	<0.001 U	**0.0038**	<0.0022 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002	NA	<0.0015 U	**0.0064**
Manganese	mg/L	NS	0.15	NA	**0.392**	**0.373**	**0.262**	**0.257**	**0.3**	**0.29**	**0.639**	**0.667**	**0.509**	**0.486**	**0.432**	**0.392**	**0.379**	NA	**0.219**	**0.213**
Mercury	mg/L	0.002	0.002	NA	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005	NA	<0.0002 U	<0.0002 U
Nickel	mg/L	NS	0.1	NA	**0.0122**	<0.011 U	**0.0248**	<0.008 U	**0.0187**	**0.0171**	**0.376**	**0.443**	**0.354**	**0.377**	**0.359**	**0.298 J-**	**0.319**	NA	**0.0355 J**	**0.0348 J**
Zinc	mg/L	NS	5.0	NA	**0.0365**	**0.027**	**0.0466**	<0.0101 U	**0.117**	**0.0387 J**	<0.005 U	**0.005**	NA	NA	NA	NA	NA	NA	**0.0083 J**	**0.0185 J**
Inorganics																				
Cyanide	mg/L	0.2	0.2	NA	<0.01 U	NA	<0.01 U	NA	<0.01 U	NA	<0.005 U	**0.008**	NA	NA	NA	NA	NA	NA	<0.01 U	NA
Sulfide	mg/L	NS	NS	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.05 U	<0.05 U	NA	NA	NA	NA	NA	NA	**0.0018**	NA

Notes:
1. Bolded cells indicate detection
2. D=Deep
3. S=Shallow
4. NA=Not Analyzed
5. Units for VOCs and SVOCs are µg/L
6. Units for metals & inorganics are mg/L
7. Shaded cells indicate exceedance of MCL or Illinois Class I Groundwater Standard
8. NS=No Standard for MCL values or Illinois Class I Groundwater
9. R=Replacement
10. DUP=Duplicate Sample
11. MCLs can be found at http://www.epa.gov/safewater/contaminants/index.html
12. This table includes analytical results for parameters detected at any time at the Site. If a parameter was never detected it is not included.
13. The Illinois Class I Groundwater Standards are located in Section 620.410 of Title 35 of the Illinois Administrative Code

Data Qualifiers:
1. U indicates the analyte was analyzed for, but was not detected above the report sample quantitation limit
2. UJ indicates the analyte was not detected above the reported sample quantitation limit, however, the reported quantitation limit is approximate
3. J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
4. B indicates the analyte result was between IDL (instrument detection limit) and contract required detection limit
5. N indicates spiked sample recovery not within control limits
6. J- indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a low bias
7. J+ indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a high bias

Table 3-4
Summary of Historical Groundwater Analytical Detections
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Location				MW-07D							MW-07S												
Date Sampled	Units	MCL	IL Class I GW Standard	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	4/13/2010	4/13/2010-DUP	12/2/2010	10/1/1993	11/1/1993	11/1/1993-DUP	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	4/12/2010	12/1/2010	12/28/2011	7/17/2012	1/9/2013	7/24/2013
VOC																							
1,1,1-Trichloroethane	µg/L	200	200	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	NA	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
1,1-Dichloroethane	µg/L	NS	700	**1 J**	NA	**1**	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	NA	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
1,1-Dichloroethene	µg/L	7	7	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<10 U	NA	NA	<1 U	<1 U	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5
1,2-Dibromo-3-chloropropane	µg/L	0.2	0.2	<1 U	NA	NA	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
1,2-Dichloroethane	µg/L	5	5	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	NA	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
1,2-Dichloroethene (Total)	µg/L	NS	NS	NA	NA	NA	NA	NA	NA	NA	**6 J**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	µg/L	5	5	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	NA	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5
1,4-Dioxane	µg/L	NS	NS	NA	NA	NA	NA	<400 UJ	<400 UJ	<400 UJ	NA	NA	NA	NA	NA	NA	NA	<400 UJ	<400 UJ	NA	NA	NA	NA
Acetone	µg/L	NS	6300	<5 U	NA	NA	NA	<100 UJ	<100 UJ	<100 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	<100 UJ	<100 UJ	NA	NA	NA	NA
Benzene	µg/L	5	5	**0.4 J**	NA	**0.7 J**	NA	<5 U	<5 U	<5 U	<10 U	NA	NA	<1 U	<1 U	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5
Bromomethane	µg/L	NS	9.8	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	NA	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Carbon disulfide	µg/L	NS	700	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	NA	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Chlorobenzene	µg/L	100	100	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<10 U	NA	NA	<1 U	<1 U	<1 U	NA	<5 U	<5 U	NA	NA	NA	NA
Chloroethane	µg/L	NS	NS	**21**	NA	**20**	NA	<10 UJ	<10 UJ	<10 UJ	**4 J**	NA	NA	<1 U	<1 U	**0.2 J**	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
Chloroform	µg/L	80	0.2	<1 U	NA	<1 U	NA	<1 UJ	<1 UJ	<1 UJ	<10 U	NA	NA	<1 U	<1 U	<1 U	NA	<1 UJ	<1 UJ	NA	NA	NA	NA
Chloromethane	µg/L	NS	NS	**1**	NA	**1**	NA	<10 UJ	<10 UJ	<10 UJ	<10 U	NA	NA	<1 U	**0.1 J**	<1 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
cis-1,2-Dichloroethene	µg/L	70	70	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Ethyl benzene	µg/L	700	700	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	NA	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Methylene chloride	µg/L	5	5	<1 U	NA	<2 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	NA	<2 U	<2 U	<2 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5
Tetrachloroethene	µg/L	5	5	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	NA	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5
Toluene	µg/L	1000	1000	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<10 U	NA	NA	<1 U	<1 U	<1 U	NA	<5 U	<5 U	NA	NA	NA	NA
trans-1,2-Dichloroethene	µg/L	100	100	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Trichloroethene	µg/L	5	5	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<10 U	NA	NA	<1 U	<1 U	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5
Vinyl chloride	µg/L	2	2	**0.2 J**	NA	<1 U	NA	<2 UJ	<2 UJ	<2 UJ	<10 U	NA	NA	<1 U	<1 U	<1 U	NA	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ
Xylene, Total	µg/L	10000	10000	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	NA	<1 U	<1 U	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
SVOC																							
2-Methylnaphthalene	µg/L	NS	NS	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ	<10 U	NA	NA	<10 U	<10 U	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
2-Methylphenol	µg/L	NS	350	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ	<10 U	NA	NA	<10 U	<10 U	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	µg/L	6	6	<10 U	NA	**20**	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	NA	<10 U	**2 J**	**9 J**	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Diethylphthalate	µg/L	NS	5600	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ	<10 U	NA	NA	<10 U	<10 U	**13**	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
Di-n-butylphthalate	µg/L	NS	700	<10 U	NA	**6 J**	NA	<10 UJ	<10 UJ	<10 UJ	<10 U	NA	NA	<10 U	<10 U	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
Naphthalene	µg/L	NS	140	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ	<10 U	NA	NA	<10 U	<10 U	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
Metals																							
Antimony	mg/L	0.006	0.006	<0.001 U	<0.0047 U	<0.001 U	<0.001 U	<0.006 U	<0.006 U	<0.006 U	NA	<0.0015 U	**0.0054 J**	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006
Arsenic	mg/L	0.010	0.05	**0.0027 B**	**0.0025 B**	<0.003 U	**0.0031 B**	<0.002 U	**0.015**	**0.008**	NA	**0.0034 J**	<0.001 U	<0.001 U	<0.001 U	<0.003 U	<0.003 U	<0.002 U	<0.002 U	<0.002 U	<0.002 UJ	<0.002 UJ	**0.003**
Barium	mg/L	2.0	2.0	**0.159 B**	**0.151 B**	**0.22**	**0.205**	**0.272**	**0.254**	**0.273**	NA	**0.129 J**	**0.137 J**	**0.138 B**	**0.171 B**	**0.175 B**	**0.165 B**	**0.245**	**0.269**	NA	NA	NA	NA
Boron	mg/L	NS	2.0	<0.1 U	**0.112**	**0.148**	NA	**0.39 J**	**0.41 J**	**0.32 J-**	NA	<0.1 U	<0.1 U	<0.1 U	<0.1 U	**0.063 B**	NA	**0.47 J**	**0.56 J-**	**0.57**	**0.56**	**0.46**	**0.42**
Chromium	mg/L	0.1	0.1	**0.0043 B**	<0.002 U	<0.003 U	**0.0032 B**	**0.004**	<0.001 U	**0.005**	NA	<0.003 U	<0.003 U	<0.002 U	<0.002 U	<0.003 U	<0.003 U	<0.001 U	**0.001**	**0.001**	**0.001**	**0.002**	<0.001
Cobalt	mg/L	NS	1.0	<0.003 U	<0.003 U	**0.0058 B**	**0.0057 B**	**0.008**	**0.007**	**0.004**	NA	**0.0036 J**	<0.003 U	<0.003 U	<0.003 U	<0.003 U	<0.003 U	<0.001 U	<0.001 U	NA	NA	NA	NA
Copper	mg/L	1.3	0.65	<0.002 U	<0.002 U	<0.006 U	<0.006 U	<0.001 U	<0.001 U	**0.001**	NA	<0.007 U	**0.0101 J**	<0.002 U	<0.002 U	<0.006 U	<0.006 U	<0.001 U	**0.001**	NA	NA	NA	NA
Iron	mg/L	NS	5.0	**3.27**	**2.95**	**5.2**	**5.09**	**3.84 J**	**4.08 J**	**4.53**	NA	**1.61**	**1.67**	**2.27**	**2.83**	**2.63**	**2.44**	**2.99 J**	**3.06**	**2.95**	**2.61**	**3.32**	**2.27**
Lead	mg/L	0.015	0.0075	<0.002 U	<1 U	**0.0025 B**	<0.002 U	<0.002 U	<0.002 U	<0.002 U	NA	<0.001 U	<0.001 U	<0.001 U	<0.001 U	**0.0026 B**	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002
Manganese	mg/L	NS	0.15	**0.388**	**0.382**	**0.549**	**0.576**	**0.176**	**0.166**	**0.117**	NA	**0.101**	**0.11**	**0.0428**	**0.0551**	**0.0459**	**0.0433**	**0.046**	**0.026**	**0.028**	**0.027**	**0.026**	**0.021**
Mercury	mg/L	0.002	0.002	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	NA	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005
Nickel	mg/L	NS	0.1	**0.0412**	<0.0391 U	**0.0651**	**0.0577**	**0.439**	**0.117**	**0.21**	NA	**0.0161 J**	**0.16 J**	**0.0162 B**	**0.0162 B**	**0.0283 B**	**0.0193 B**	**0.048**	**0.049**	**0.049**	**0.043**	**0.052 J-**	**0.035**
Zinc	mg/L	NS	5.0	**0.0221**	<0.0168 U	**0.0993**	**0.0211**	<0.005 U	<0.005 U	<0.005 U	NA	**0.0068 J**	**0.0185 J**	**0.0202**	**0.0202**	**0.0734**	**0.015 J**	<0.005 U	<0.005 U	NA	NA	NA	NA
Inorganics																							
Cyanide	mg/L	0.2	0.2	<0.01 U	NA	<0.01 U	NA	<0.005 U	<0.005 U	<0.005 U	NA	<0.01 U	NA	<0.01 U	<0.01 U	<0.01 U	NA	<0.005 U	<0.005 U	NA	NA	NA	NA
Sulfide	mg/L	NS	NS	**0.0016**	NA	<0.001 U	NA	<0.05 U	<0.05 U	<0.05 U	NA	<0.001 U	NA	<0.001 U	<0.001 U	<0.001 U	NA	<0.05 U	<0.05 U	NA	NA	NA	NA

Notes:
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4. B indicates the analyte result was between IDL (instrument detection limit) and contract required detection limit
5. N indicates spiked sample recovery not within control limits
6. J- indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a low bias
7. J+ indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a high bias

Table 3-4
Summary of Historical Groundwater Analytical Detections
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Location				MW-08D									MW-08S						
Date Sampled	Units	MCL	IL Class I GW Standard	11/1/1993	11/1/1993-DUP	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	4/12/2010	12/2/2010	12/2/2010-DUP	11/1/1993	11/1/1993-DUP	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	4/12/2010
VOC																			
1,1,1-Trichloroethane	μg/L	200	200	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ
1,1-Dichloroethane	μg/L	NS	700	<10 U	NA	**0.5 J**	NA	**0.4 J**	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	**9**	NA	**5**	NA	**12.5 J**
1,1-Dichloroethene	μg/L	7	7	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<10 U	NA	<1 U	NA	<1 U	NA	<5 U
1,2-Dibromo-3-chloropropane	μg/L	0.2	0.2	NA	NA	<1 U	NA	NA	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	<1 U	NA	NA	NA	<10 UJ
1,2-Dichloroethane	μg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ
1,2-Dichloroethene (Total)	μg/L	NS	NS	<10 U	NA	NA	NA	NA	NA	NA	NA	NA	<10 U	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	μg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ
1,4-Dioxane	μg/L	NS	NS	NA	NA	NA	NA	NA	NA	<400 UJ	<400 UJ	<400 UJ	NA	NA	NA	NA	NA	NA	<400 UJ
Acetone	μg/L	NS	6300	<10 UJ	NA	<5 U	NA	NA	NA	<100 UJ	<100 UJ	<100 UJ	<10 UJ	NA	NA	NA	NA	NA	<100 UJ
Benzene	μg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<10 U	NA	**0.3 J**	NA	**0.2 J**	NA	<5 U
Bromomethane	μg/L	NS	9.8	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	**0.1**	NA	<1 U	NA	<5 UJ
Carbon disulfide	μg/L	NS	700	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ
Chlorobenzene	μg/L	100	100	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<10 U	NA	<1 U	NA	<1 U	NA	<5 U
Chloroethane	μg/L	NS	NS	<10 U	NA	**0.6 J**	NA	**0.5 J**	NA	<10 UJ	<10 UJ	<10 UJ	<10 U	NA	**2**	NA	**2**	NA	<10 UJ
Chloroform	μg/L	80	0.2	<10 U	NA	<1 U	NA	<1 U	NA	<1 UJ	<1 UJ	<1 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<1 UJ
Chloromethane	μg/L	NS	NS	<10 U	NA	<1 U	NA	**0.1**	NA	<10 UJ	<10 UJ	<10 UJ	<10 U	NA	**0.6 J**	NA	**0.2 J**	NA	<10 UJ
cis-1,2-Dichloroethene	μg/L	70	70	NA	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	**0.5 J**	NA	**0.2 J**	NA	<5 UJ
Ethyl benzene	μg/L	700	700	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ
Methylene chloride	μg/L	5	5	<10 U	NA	<2 U	NA	<2 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	<1 U	NA	<2 U	NA	<5 UJ
Tetrachloroethene	μg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ
Toluene	μg/L	1000	1000	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<10 U	NA	<1 U	NA	<1 U	NA	<5 U
trans-1,2-Dichloroethene	μg/L	100	100	NA	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	<1 U	NA	<1 U	NA	<5 UJ
Trichloroethene	μg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<10 U	NA	<1 U	NA	<1 U	NA	<5 U
Vinyl chloride	μg/L	2	2	<10 U	NA	<1 U	NA	<1 U	NA	<2 UJ	<2 UJ	<2 UJ	<10 U	NA	**0.6 J**	NA	**0.3 J**	NA	<2 UJ
Xylene, Total	μg/L	10000	10000	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ
SVOC																			
2-Methylnaphthalene	μg/L	NS	NS	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ
2-Methylphenol	μg/L	NS	350	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ
bis(2-Ethylhexyl) phthalate	μg/L	6	6	<10 U	NA	**5 J**	NA	<10 U	NA	<5 UJ	<5 UJ	<5 UJ	<10 U	NA	<10 U	NA	<10 U	NA	<5 UJ
Diethylphthalate	μg/L	NS	5600	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ
Di-n-butylphthalate	μg/L	NS	700	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ
Naphthalene	μg/L	NS	140	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 UJ	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ
Metals																			
Antimony	mg/L	0.006	0.006	<0.0015 U	**0.0058 J**	<0.001 U	<0.0013 U	<0.001 U	<0.001 U	<0.006 U	<0.006 U	<0.006 U	<0.0015 U	**0.0033 J**	<0.001 U	<0.0014 U	<0.001 U	<0.001 U	<0.006 U
Arsenic	mg/L	0.010	0.05	**0.0033 J**	**0.0032 J**	**0.0055 B**	**0.0041 B**	<0.003 U	**0.0059 B**	<0.002 U	**0.009**	**0.008**	**0.0118**	**0.0121**	**0.0095 B**	**0.0104**	**0.0067 B**	**0.009 B**	**0.052**
Barium	mg/L	2.0	2.0	**0.0943 J**	**0.11 J**	**0.185 B**	**0.122 B**	**0.134 B**	**0.121 B**	**0.196**	**0.192**	**0.178**	**0.185 J**	**0.185 J**	**0.174 B**	**0.16 B**	**0.196 B**	**0.203**	**0.523**
Boron	mg/L	NS	2.0	<0.1 U	<0.1 U	<0.1 U	<0.1 U	**0.0222 B**	NA	<0.01 UJ	**0.02 J-**	**0.02 J-**	<0.1 U	<0.1 U	<0.1 U	<0.1 U	**0.016 B**	NA	**0.25 J**
Chromium	mg/L	0.1	0.1	<0.003 U	<0.003 U	**0.0031 B**	<0.002 U	<0.003 U	<0.003 U	<0.001 U	<0.001 U	<0.001 U	<0.003 U	<0.003 U	<0.002 U	<0.002 U	<0.003 U	<0.003 U	**0.009**
Cobalt	mg/L	NS	1.0	<0.003 U	<0.003 U	<0.003 U	<0.003 U	<0.003 U	<0.003 U	<0.001 U	<0.001 U	**0.001**	<0.003 U	<0.003 U	<0.003 U	<0.003 U	<0.003 U	<0.003 U	<0.001 U
Copper	mg/L	1.3	0.65	<0.0128 U	<0.007 U	<0.002 U	<0.002 U	<0.006 U	<0.006 U	<0.001 U	**0.002**	**0.002**	<0.0152 U	<0.007 U	<0.002 U	<0.002 U	<0.006 U	<0.006 U	<0.001 U
Iron	mg/L	NS	5.0	**0.725**	**0.274**	**1.63**	**0.403**	**0.826**	**0.471**	**1.3 J**	**1.34**	**1.22**	**4.1**	**4.36**	**2.71**	**2.8**	**2.34**	**2.41**	**6.53 J**
Lead	mg/L	0.015	0.0075	<0.002 U	<0.002 U	**0.0043 J**	<0.0016 U	**0.0034**	<0.0021 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	**0.0052**	<0.001 U	<0.001 U	**0.0037**	<0.002 U	<0.002 U
Manganese	mg/L	NS	0.15	**0.118**	**0.108**	**0.145**	**0.0852**	**0.0921**	**0.0889**	**0.095**	**0.077**	**0.073**	**0.0666**	**0.0714**	**0.0522**	**0.0515**	**0.0656**	**0.0669**	**0.109**
Mercury	mg/L	0.002	0.002	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0003 U	<0.0002 U	<0.0002 U	<0.0002 U
Nickel	mg/L	NS	0.1	<0.011 U	**0.0144 J**	**0.0123 B**	<0.008 U	**0.0162 B**	<0.007 U	**0.004**	**0.008**	**0.008**	<0.011 U	<0.011 U	<0.008 U	<0.008 U	**0.0101 B**	<0.007 U	**0.037**
Zinc	mg/L	NS	5.0	<0.0185 U	<0.0082 U	**0.0327**	<0.014 U	**0.0995**	**0.0277 J**	<0.005 U	**0.005**	<0.005 U	<0.0225 U	<0.0124 U	**0.0226**	<0.0247 U	**0.116**	**0.0375 J**	<0.005 U
Inorganics																			
Cyanide	mg/L	0.2	0.2	<0.01 U	NA	<0.01 U	NA	<0.01 U	NA	<0.005 U	<0.005 U	<0.005 U	<0.01 U	NA	<0.01 U	NA	<0.01 U	NA	<0.005 U
Sulfide	mg/L	NS	NS	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.05 U	<0.05 U	<0.05 U	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.05 U

Notes:
1. Bolded cells indicate detection
2. D=Deep
3. S=Shallow
4. NA=Not Analyzed
5. Units for VOCs and SVOCs are μg/L
6. Units for metals & inorganics are mg/L
7. Shaded cells indicate exceedance of MCL or Illinois Class I Groundwater Standard
8. NS=No Standard for MCL values or Illinois Class I Groundwater
9. R=Replacement
10. DUP=Duplicate Sample
11. MCLs can be found at http://www.epa.gov/safewater/contaminants/index.html
12. This table includes analytical results for parameters detected at any time at the Site. If a parameter was never detected it is not included.
13. The Illinois Class I Groundwater Standards are located in Section 620.410 of Title 35 of the Illinois Administrative Code

Data Qualifiers:
1. U indicates the analyte was analyzed for, but was not detected above the report sample quantitation limit
2. UJ indicates the analyte was not detected above the reported sample quantitation limit, however, the reported quantitation limit is approximate
3. J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
4. B indicates the analyte result was between IDL (instrument detection limit) and contract required detection limit
5. N indicates spiked sample recovery not within control limits
6. J- indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a low bias
7. J+ indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a high bias

Table 3-4
Summary of Historical Groundwater Analytical Detections
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Location				MW-08S							MW-09D												MW-09S	
Date Sampled	Units	MCL	IL Class I GW Standard	12/1/2010	12/27/2011	7/18/2012	1/9/2013	1/9/2013-Dup	7/24/2013	7/24/2013-Dup	11/1/1993	11/1/1993-DUP	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	4/9/2010	12/1/2010	12/27/2011	7/18/2012	1/9/2013	7/23/2013	11/1/1993	11/1/1993-DUP
VOC																								
1,1,1-Trichloroethane	µg/L	200	200	<5 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	NA
1,1-Dichloroethane	µg/L	NS	700	**10.9**	NA	NA	NA	NA	NA	NA	<10 U	NA	**0.3 J**	NA	**1**	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	**9 J**	NA
1,1-Dichloroethene	µg/L	7	7	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<5	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<10 U	NA
1,2-Dibromo-3-chloropropane	µg/L	0.2	0.2	<10 UJ	NA	NA	NA	NA	NA	NA	NA	NA	<1 U	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	µg/L	5	5	<5 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	NA
1,2-Dichloroethene (Total)	µg/L	NS	NS	NA	NA	NA	NA	NA	NA	NA	<10 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10 U	NA
1,2-Dichloropropane	µg/L	5	5	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5	<5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5	<10 U	NA
1,4-Dioxane	µg/L	NS	NS	<400 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<400 UJ	<400 UJ	NA	NA	NA	NA	NA	NA
Acetone	µg/L	NS	6300	<100 UJ	NA	NA	NA	NA	NA	NA	<10 UJ	NA	<5 U	NA	NA	NA	<100 UJ	<100 UJ	NA	NA	NA	NA	<10 UJ	NA
Benzene	µg/L	5	5	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<5	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<10 U	NA
Bromomethane	µg/L	NS	9.8	<5 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	NA
Carbon disulfide	µg/L	NS	700	<5 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	NA
Chlorobenzene	µg/L	100	100	<5 U	NA	NA	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	NA	NA	NA	NA	<10 U	NA
Chloroethane	µg/L	NS	NS	<10 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	NA
Chloroform	µg/L	80	0.2	<1 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<1 UJ	<1 UJ	NA	NA	NA	NA	<10 U	NA
Chloromethane	µg/L	NS	NS	<10 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	NA
cis-1,2-Dichloroethene	µg/L	70	70	<5 UJ	NA	NA	NA	NA	NA	NA	NA	NA	**0.1 J**	NA	**0.5 J**	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA
Ethyl benzene	µg/L	700	700	<5 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	NA
Methylene chloride	µg/L	5	5	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5	<5	<10 U	NA	<2 U	NA	<2 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5	<10 U	NA
Tetrachloroethene	µg/L	5	5	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5	<5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5	**2 J**	NA
Toluene	µg/L	1000	1000	<5 U	NA	NA	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	NA	NA	NA	NA	<10 U	NA
trans-1,2-Dichloroethene	µg/L	100	100	<5 UJ	NA	NA	NA	NA	NA	NA	NA	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA
Trichloroethene	µg/L	5	5	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<5	<10 U	NA	<1 U	NA	**0.1 J**	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<10 U	NA
Vinyl chloride	µg/L	2	2	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<10 U	NA	<1 U	NA	**0.2 J**	NA	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<10 U	NA
Xylene, Total	µg/L	10000	10000	<5 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	NA
SVOC																								
2-Methylnaphthalene	µg/L	NS	NS	<10 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	NA
2-Methylphenol	µg/L	NS	350	<10 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	NA
bis(2-Ethylhexyl) phthalate	µg/L	6	6	<5 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA	<10 U	NA	**6 J**	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	NA
Diethylphthalate	µg/L	NS	5600	<10 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	NA
Di-n-butylphthalate	µg/L	NS	700	<10 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	NA
Naphthalene	µg/L	NS	140	<10 UJ	NA	NA	NA	NA	NA	NA	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	NA
Metals																								
Antimony	mg/L	0.006	0.006	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006	<0.006	<0.0015 U	**0.0047 J**	<0.001 U	<0.0012 U	<0.001 U	<0.001 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006	<0.0015 U	**0.0022 J**
Arsenic	mg/L	0.010	0.05	**0.056**	**0.055**	**0.063 J**	**0.051 J-**	**0.052 J-**	**0.051**	**0.049**	**0.0098 J**	**0.0055 J**	**0.0062 B**	**0.0067 B**	**0.0054 B**	**0.0079 B**	<0.002 U	**0.007**	**0.009**	**0.005 J**	**0.007 J-**	**0.008**	**0.0015 J**	<0.001 U
Barium	mg/L	2.0	2.0	**0.381**	NA	NA	NA	NA	NA	NA	**0.466**	**0.462**	**0.426**	**0.418**	**0.521**	**0.479**	**0.509**	**0.562**	NA	NA	NA	NA	**0.0647 J**	**0.0667 J**
Boron	mg/L	NS	2.0	**0.26 J-**	**0.29**	**0.33**	**0.27**	**0.29**	**0.29**	**0.27**	**0.101**	**0.137**	<0.1 U	<0.1 U	**0.123**	NA	**0.05 J**	**0.06 J-**	**0.04**	**0.04**	**0.04**	**0.03**	<0.1 U	**0.1**
Chromium	mg/L	0.1	0.1	**0.007**	**0.006**	**0.004**	**0.002**	**0.003**	**0.002**	**0.001**	<0.003 U	<0.003 U	<0.002 U	<0.002 U	**0.0032 B**	<0.003 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001	<0.003 U	<0.003 U
Cobalt	mg/L	NS	1.0	<0.001 U	NA	NA	NA	NA	NA	NA	**0.004 J**	<0.003 U	<0.003 U	<0.003 U	<0.003 U	<0.003 U	<0.001 U	<0.001 U	NA	NA	NA	NA	<0.003 U	<0.003 U
Copper	mg/L	1.3	0.65	<0.001 U	NA	NA	NA	NA	NA	NA	<0.007 U	<0.007 U	<0.002 U	<0.002 U	<0.006 U	<0.006 U	<0.001 U	<0.001 U	NA	NA	NA	NA	<0.007 U	**0.0074 J**
Iron	mg/L	NS	5.0	**5.54**	**5.48**	**6.33**	**5.97**	**6.33**	**7.22**	**6.39**	**2.35**	**1.55**	**1.81**	**1.36**	**2.32**	**1.68**	**1.66 J**	**1.33**	**0.99**	**0.54**	**0.92**	**0.66**	**0.182**	<0.087 U
Lead	mg/L	0.015	0.0075	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002	<0.002	<0.002 U	**0.001**	**0.0013**	<0.001 U	**0.0039**	<0.0075 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002	<0.001 U	**0.0034**
Manganese	mg/L	NS	0.15	**0.073**	**0.067**	**0.071**	**0.052**	**0.055**	**0.091**	**0.085**	**0.0378**	**0.0336**	**0.0318**	**0.0255**	**0.0398**	**0.0341**	**0.033**	**0.022**	**0.019**	**0.016**	**0.017**	**0.021**	**0.0085 J**	**0.0078 J**
Mercury	mg/L	0.002	0.002	<0.0002 U	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005	<0.0005	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005	<0.0002 U	<0.0002 U
Nickel	mg/L	NS	0.1	**0.039**	**0.039**	**0.043**	**0.035 J-**	**0.038 J-**	**0.052**	**0.048**	**0.0137 J**	**0.0132 J**	**0.0125 B**	<0.008 U	**0.0229 B**	**0.0221 B**	**0.003**	**0.005**	**0.004**	**0.004**	**0.002 J-**	**0.004**	<0.011 U	<0.011 U
Zinc	mg/L	NS	5.0	<0.005 U	NA	NA	NA	NA	NA	NA	**0.0169 J**	**0.0083 J**	**0.0208**	<0.01 U	**0.0632**	**0.119 J**	<0.005 U	<0.005 U	NA	NA	NA	NA	**0.0076 J**	**0.0123 J**
Inorganics																								
Cyanide	mg/L	0.2	0.2	<0.005 U	NA	NA	NA	NA	NA	NA	<0.01 U	NA	<0.01 U	NA	<0.01 U	NA	<0.005 U	<0.005 U	NA	NA	NA	NA	<0.01 U	NA
Sulfide	mg/L	NS	NS	<0.05 U	NA	NA	NA	NA	NA	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	**0.13**	**0.3**	NA	NA	NA	NA	<0.001 U	NA

Notes:
1. Bolded cells indicate detection
2. D=Deep
3. S=Shallow
4. NA=Not Analyzed
5. Units for VOCs and SVOCs are µg/L
6. Units for metals & inorganics are mg/L
7. Shaded cells indicate exceedance of MCL or Illinois Class I Groundwater Standard
8. NS=No Standard for MCL values or Illinois Class I Groundwater
9. R=Replacement
10. DUP=Duplicate Sample
11. MCLs can be found at http://www.epa.gov/safewater/contaminants/index.html
12. This table includes analytical results for parameters detected at any time at the Site. If a parameter was never detected it is not included.
13. The Illinois Class I Groundwater Standards are located in Section 620.410 of Title 35 of the Illinois Administrative Code

Data Qualifiers:
1. U indicates the analyte was analyzed for, but was not detected above the report sample quantitation limit
2. UJ indicates the analyte was not detected above the reported sample quantitation limit, however, the reported quantitation limit is approximate
3. J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
4. B indicates the analyte result was between IDL (instrument detection limit) and contract required detection limit
5. N indicates spiked sample recovery not within control limits
6. J- indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a low bias
7. J+ indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a high bias

Table 3-4
Summary of Historical Groundwater Analytical Detections
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Location				MW-09S											MW-10D							
Date Sampled	Units	MCL	IL Class I GW Standard	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	11/1/1995	4/9/2010	12/1/2010	12/27/2011	7/18/2012	1/9/2013	7/23/2013	11/1/1993	11/1/1993-DUP	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	4/6/2010	12/2/2010
VOC																						
1,1,1-Trichloroethane	µg/L	200	200	<1 U	NA	<2 U	<1 U	<2 U	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<5 UJ	<5 UJ
1,1-Dichloroethane	µg/L	NS	700	<1 U	NA	**22**	**24**	**22**	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<5 UJ	<5 UJ
1,1-Dichloroethene	µg/L	7	7	<1 U	NA	<2 U	<1 U	<2 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<5 U	<5 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	0.2	<1 U	NA	NA	NA	<2 U	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	<1 U	NA	NA	NA	<10 UJ	<10 UJ
1,2-Dichloroethane	µg/L	5	5	<1 U	NA	<2 U	<1 U	<2 U	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<5 UJ	<5 UJ
1,2-Dichloroethene (Total)	µg/L	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10 U	<10 U	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	µg/L	5	5	<1 U	NA	<2 U	**1 J**	**1 J**	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<5 UJ	<5 UJ
1,4-Dioxane	µg/L	NS	NS	NA	NA	NA	NA	NA	<400 UJ	<400 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<400 UJ	<400 UJ
Acetone	µg/L	NS	6300	<12 U	NA	NA	NA	NA	<100 UJ	<100 UJ	NA	NA	NA	NA	<10 UJ	<10 UJ	<5 U	NA	NA	NA	<100 UJ	<100 UJ
Benzene	µg/L	5	5	<1 U	NA	**3**	**3**	**3**	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<5 U	<5 U
Bromomethane	µg/L	NS	9.8	<1 U	NA	<2 U	<1 U	<2 U	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<5 UJ	<5 UJ
Carbon disulfide	µg/L	NS	700	<1 U	NA	<2 U	<1 U	<2 U	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<5 UJ	<5 UJ
Chlorobenzene	µg/L	100	100	<1 U	NA	<2 U	<1 U	<2 U	<5 U	<5 U	NA	NA	NA	NA	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<5 U	<5 U
Chloroethane	µg/L	NS	NS	<1 U	NA	**1 J**	**2**	**1 J**	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<10 UJ	<10 UJ
Chloroform	µg/L	80	0.2	<1 U	NA	**3**	**4**	**4**	<1 UJ	<1 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<1 UJ	<1 UJ
Chloromethane	µg/L	NS	NS	<1 U	NA	**0.2 J**	<1 U	<2 U	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<10 UJ	<10 UJ
cis-1,2-Dichloroethene	µg/L	70	70	<1 U	NA	**6**	**6**	**6**	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	<1 U	NA	<1 U	<1 U	<5 UJ	<5 UJ
Ethyl benzene	µg/L	700	700	<1 U	NA	<2 U	<1 U	<2 U	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<5 UJ	<5 UJ
Methylene chloride	µg/L	5	5	<3 U	NA	<4 U	<2 U	<4 U	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5	<10 U	<10 U	<2 U	NA	<2 U	<2 U	<5 UJ	<5 UJ
Tetrachloroethene	µg/L	5	5	<1 U	NA	**2**	**3**	**2 J**	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<5 UJ	<5 UJ
Toluene	µg/L	1000	1000	<1 U	NA	<2 U	<1 U	<2 U	<5 U	<5 U	NA	NA	NA	NA	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<5 U	<5 U
trans-1,2-Dichloroethene	µg/L	100	100	<1 U	NA	**0.6 J**	**0.7 J**	**0.7 J**	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	<1 U	NA	<1 U	<1 U	<5 UJ	<5 UJ
Trichloroethene	µg/L	5	5	<1 U	NA	**1 J**	**1**	**1 J**	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<5 U	<5 U
Vinyl chloride	µg/L	2	2	<1 U	NA	**2 J**	**2**	**2**	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<2 UJ	<2 UJ
Xylene, Total	µg/L	10000	10000	<1 U	NA	<2 U	<1 U	<2 U	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<1 U	NA	<1 U	<1 U	<5 UJ	<5 UJ
SVOC																						
2-Methylnaphthalene	µg/L	NS	NS	<10 U	NA	<10 U	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	<10 U	<10 U	<10 UJ	<10 UJ
2-Methylphenol	µg/L	NS	350	<10 U	NA	<10 U	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	<10 U	<10 U	<10 UJ	<10 UJ
bis(2-Ethylhexyl) phthalate	µg/L	6	6	<10 U	NA	**12**	**19**	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	**6 J**	**3 J**	<5 UJ	<5 UJ
Diethylphthalate	µg/L	NS	5600	<10 U	NA	<10 U	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	<10 U	<10 U	<10 UJ	<10 UJ
Di-n-butylphthalate	µg/L	NS	700	<10 U	NA	<10 U	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	<10 U	<10 U	<10 UJ	<10 UJ
Naphthalene	µg/L	NS	140	<10 U	NA	<10 U	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	<10 U	<10 U	<10 UJ	<10 UJ
Metals																						
Antimony	mg/L	0.006	0.006	<0.001 U	<0.001 U	<0.001 U	<0.001 U	NA	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006	**0.0017**	<0.0015 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.006 U	<0.006 U
Arsenic	mg/L	0.010	0.05	<0.001 U	<0.001 U	<0.003 U	<0.003 U	NA	<0.002 U	<0.002 U	<0.002 U	<0.002 UJ	<0.002 UJ	<0.002	**0.0018 J**	**0.0019 J**	<0.001 U	<0.001 U	<0.003 U	<0.003 U	<0.002 U	<0.002 U
Barium	mg/L	2.0	2.0	**0.103 B**	**0.1 B**	**0.0926 B**	**0.0926 B**	NA	**0.089**	**0.082**	NA	NA	NA	NA	**0.185 J**	**0.185 J**	**0.169 B**	**0.148 B**	**0.208**	**0.208**	**0.262**	**0.273**
Boron	mg/L	NS	2.0	<0.1 U	<0.1 U	**0.196**	**0.197**	NA	**0.13 J**	**0.12 J-**	**0.17**	**0.14**	**0.14**	**0.12**	<0.1 U	<0.1 U	<0.1 U	<0.1 U	**0.0154 B**	**0.0109 B**	<0.01 UJ	**0.02 J-**
Chromium	mg/L	0.1	0.1	**0.0043 B**	<0.002 U	**0.005 B**	**0.0057 B**	NA	<0.001 U	**0.001**	**0.002**	**0.001**	**0.006**	<0.001	<0.003 U	<0.003 U	<0.002 U	<0.002 U	<0.003 U	<0.003 U	<0.001 U	<0.001 U
Cobalt	mg/L	NS	1.0	<0.003 U	<0.003 U	<0.003 U	<0.003 U	NA	<0.001 U	<0.001 U	NA	NA	NA	NA	<0.003 U	<0.003 U	<0.003 U	<0.003 U	<0.003 U	<0.003 U	<0.001 U	<0.001 U
Copper	mg/L	1.3	0.65	<0.0038 U	<0.002 U	<0.006 U	<0.006 U	NA	<0.001 U	**0.002**	NA	NA	NA	NA	<0.008 U	<0.007 U	<0.002 U	<0.002 U	<0.006 U	<0.006 U	<0.001 U	<0.001 U
Iron	mg/L	NS	5.0	<0.155 U	<0.0449 U	**0.14**	**0.132**	NA	<0.01 UJ	**0.06**	**0.17 J+**	**0.05**	**1.34**	**0.12**	**1.79**	**1.9**	**2.92**	**2.83**	**2.6**	**2.55**	**3.62 J**	**4.58**
Lead	mg/L	0.015	0.0075	<0.001 U	<0.001 U	**0.0026 B**	**0.0026 B**	NA	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002	<0.002 U	<0.002 U	<0.001 U	<0.001 U	**0.0037**	**0.003**	<0.002 U	<0.002 U
Manganese	mg/L	NS	0.15	**0.0385**	**0.0376**	**0.03**	**0.0295**	NA	**0.004**	**0.004**	**0.010**	**0.002**	**0.046**	**0.008**	**0.111**	**0.116**	**0.048**	**0.049**	**0.0356**	**0.0336**	**0.055**	**0.068**
Mercury	mg/L	0.002	0.002	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	NA	<0.0002 U	<0.0002 U	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	U	<0.0002 U
Nickel	mg/L	NS	0.1	**0.0701**	<0.0646 U	**0.0378 B**	**0.0346 B**	NA	**0.014**	**0.014**	**0.029**	**0.015**	**0.046 J-**	**0.012**	<0.011 U	<0.011 U	<0.008 U	<0.0082 U	**0.0148 B**	<0.007 U	**0.02**	**0.002**
Zinc	mg/L	NS	5.0	**0.0165 B**	<0.0208 U	**0.0482**	**0.0283**	NA	<0.005 U	<0.005 U	NA	NA	NA	NA	<0.0134 U	<0.0116 U	**0.0333**	<0.0131 U	**0.313**	**0.133**	<0.005 U	<0.005 U
Inorganics																						
Cyanide	mg/L	0.2	0.2	<0.01 U	NA	<0.01 U	<0.01 U	NA	<0.005 U	<0.005 U	NA	NA	NA	NA	<0.01 U	<0.01 U	<0.01 U	NA	<0.01 U	<0.01 U	<0.005 U	<0.005 U
Sulfide	mg/L	NS	NS	<0.001 U	NA	<0.001 U	<0.001 U	NA	<0.05 U	<0.05 U	NA	NA	NA	NA	<0.001 U	<0.001 U	<0.001 U	NA	<0.001 U	<0.001 U	<0.05 U	<0.05 U

Notes:
1. Bolded cells indicate detection
2. D=Deep
3. S=Shallow
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5. Units for VOCs and SVOCs are µg/L
6. Units for metals & inorganics are mg/L
7. Shaded cells indicate exceedance of MCL or Illinois Class I Groundwater Standard
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5. N indicates spiked sample recovery not within control limits
6. J- indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a low bias
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Summary of Historical Groundwater Analytical Detections
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Location				MW-10S								MW-11				MW-11R						
Date Sampled	Units	MCL	IL Class I GW Standard	11/1/1993	11/1/1993-DUP	12/1/1994	12/1/1994-DUP	9/1/1995	9/1/1995-DUP	4/6/2010	12/2/2010	9/1/1995	9/1/1995-DUP	11/1/1995	11/1/1995-DUP	4/26/2010	4/26/2010-DUP	12/3/2010	12/28/2011	7/18/2012	1/9/2013	7/24/2013
VOC																						
1,1,1-Trichloroethane	µg/L	200	200	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<1 U	NA	<1 U	<1 U	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA
1,1-Dichloroethane	µg/L	NS	700	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	**3**	NA	**4**	**3**	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA
1,1-Dichloroethene	µg/L	7	7	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<1 U	NA	<1 U	<1 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5
1,2-Dibromo-3-chloropropane	µg/L	0.2	0.2	NA	NA	<1 U	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	<1 U	<1 U	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA
1,2-Dichloroethane	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<1 U	NA	<1 U	<1 U	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA
1,2-Dichloroethene (Total)	µg/L	NS	NS	<10 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<1 U	NA	**0.3 J**	**0.3 J**	<5 UJ	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5
1,4-Dioxane	µg/L	NS	NS	NA	NA	NA	NA	NA	NA	<400 UJ	<400 UJ	NA	NA	NA	NA	<400 UJ	<400 UJ	<400 UJ	NA	NA	NA	NA
Acetone	µg/L	NS	6300	<10 U	NA	<5 U	NA	NA	NA	<100 UJ	<100 UJ	NA	NA	NA	NA	<100 UJ	<100 UJ	<100 UJ	NA	NA	NA	NA
Benzene	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<1 U	NA	<1 U	<1 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5
Bromomethane	µg/L	NS	9.8	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<1 U	NA	<1 U	<1 U	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA
Carbon disulfide	µg/L	NS	700	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<1 U	NA	<1 U	<1 U	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA
Chlorobenzene	µg/L	100	100	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<1 U	NA	<1 U	<1 U	<5 U	<5 U	<5 U	NA	NA	NA	NA
Chloroethane	µg/L	NS	NS	<10 U	NA	<1 U	NA	<1 U	NA	<10 UJ	<10 UJ	**0.8 J**	NA	**1 J**	**0.9 J**	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA
Chloroform	µg/L	80	0.2	<10 U	NA	<1 U	NA	<1 U	NA	<1 UJ	<1 UJ	<1 U	NA	<1 U	<1 U	<1 UJ	<1 UJ	<1 UJ	NA	NA	NA	NA
Chloromethane	µg/L	NS	NS	<10 U	NA	<1 U	NA	**0.2 J**	NA	<10 UJ	<10 UJ	<1 U	NA	**0.1 J**	<1 U	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA
cis-1,2-Dichloroethene	µg/L	70	70	NA	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	**2**	NA	**3**	**3**	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA
Ethyl benzene	µg/L	700	700	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<1 U	NA	<1 U	<1 U	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA
Methylene chloride	µg/L	5	5	<10 U	NA	<2 U	NA	<2 U	NA	<5 UJ	<5 UJ	<2 U	NA	<2 U	<2 U	<5 UJ	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5
Tetrachloroethene	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	**0.1 J**	NA	**0.2 J**	**0.1 J**	<5 UJ	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5
Toluene	µg/L	1000	1000	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	<1 U	NA	<1 U	<1 U	<5 U	<5 U	<5 U	NA	NA	NA	NA
trans-1,2-Dichloroethene	µg/L	100	100	NA	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<1 U	NA	**0.1 J**	**0.1 J**	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA
Trichloroethene	µg/L	5	5	<10 U	NA	<1 U	NA	<1 U	NA	<5 U	<5 U	**0.2 J**	NA	**0.4 J**	**0.4 J**	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5
Vinyl chloride	µg/L	2	2	<10 U	NA	<1 U	NA	<1 U	NA	<2 UJ	<2 UJ	<1 U	NA	<1 U	<1 U	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ
Xylene, Total	µg/L	10000	10000	<10 U	NA	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<1 U	NA	<1 U	<1 U	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA
SVOC																						
2-Methylnaphthalene	µg/L	NS	NS	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 U	NA	<10 U	<10 U	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA
2-Methylphenol	µg/L	NS	350	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 U	NA	<10 U	<10 U	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	µg/L	6	6	<10 U	NA	<10 U	NA	**17**	NA	<5 UJ	<5 UJ	**8 J**	NA	<10 U	<10 U	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA
Diethylphthalate	µg/L	NS	5600	**19**	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 U	NA	<10 U	<10 U	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA
Di-n-butylphthalate	µg/L	NS	700	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 U	NA	<10 U	<10 U	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA
Naphthalene	µg/L	NS	140	<10 U	NA	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	<10 U	NA	<10 U	<10 U	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA
Metals																						
Antimony	mg/L	0.006	0.006	<0.0015 U	**0.0039 J**	<0.001 U	<0.0031 U	<0.001 U	<0.001 U	<0.006 U	<0.006 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006
Arsenic	mg/L	0.010	0.05	**0.0053 J**	**0.0065 J**	**0.005 B**	**0.0056 B**	**0.0057 B**	**0.0069 B**	<0.002 U	**0.02**	<0.003 U	<0.003 U	<0.001 U	<0.001 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 UJ	**0.004 J-**	<0.002
Barium	mg/L	2.0	2.0	**0.431**	**0.431**	**0.528**	**0.528**	**0.483**	**0.45**	**0.175**	**0.416**	**0.112 B**	**0.107 B**	**0.0919 B**	**0.0947 B**	**0.04**	**0.042**	**0.098**	NA	NA	NA	NA
Boron	mg/L	NS	2.0	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	**0.0503 B**	<0.01 UJ	**0.05 J-**	**0.965**	NA	**0.982**	**0.962**	**0.32 J**	**0.34 J**	**1.04 J-**	**0.78**	**0.32**	**0.85**	**0.29**
Chromium	mg/L	0.1	0.1	<0.0032 U	<0.003 U	**0.0026 B**	<0.002 U	<0.003 U	<0.003 U	<0.001 U	<0.001 U	**0.0044 B**	<0.003 U	**0.002 B**	**0.0012 B**	<0.001 U	<0.001 U	**0.011**	**0.019**	**0.094**	**0.099**	**0.222**
Cobalt	mg/L	NS	1.0	**0.0053**	<0.003 U	**0.0035 B**	**0.0038 B**	<0.003 U	<0.003 U	<0.001 U	**0.002**	**0.0063 B**	**0.005 B**	**0.0056 B**	**0.0061 B**	<0.001 U	<0.001 U	**0.009**	NA	NA	NA	NA
Copper	mg/L	1.3	0.65	<0.0091 U	<0.007 U	<0.002 U	<0.002 U	<0.006 U	<0.006 U	<0.001 U	<0.001 U	<0.006 U	**0.0078 B**	**0.0123 B**	**0.0135 B**	<0.001 U	<0.001 U	**0.01**	NA	NA	NA	NA
Iron	mg/L	NS	5.0	**1.53**	**1.42**	**1.74**	**1.75**	**1.66**	**0.533**	**1.25 J**	**4.96**	**0.142**	**0.248**	<0.01 U	**0.0164 B**	**0.44 J**	**0.38 J**	**1.85**	**2.87**	**4.17**	**9.61**	**4.05**
Lead	mg/L	0.015	0.0075	<0.002 U	**0.0079**	<0.001 U	<0.001 U	**0.0026 B**	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	**0.007**	**0.0088**	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002
Manganese	mg/L	NS	0.15	**0.5**	**0.496**	**0.564**	**0.586**	**0.528**	**0.515**	**0.565**	**0.462**	**0.0842**	**0.0834**	**0.152**	**0.142**	**0.246**	**0.236**	**0.239**	**0.100**	**0.107**	**0.337**	**0.060**
Mercury	mg/L	0.002	0.002	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005
Nickel	mg/L	NS	0.1	<0.011 U	<0.011 U	<0.008 U	<0.008 U	<0.007 U	<0.007 U	<0.001 U	**0.005**	**0.118**	**0.138**	**0.0926**	**0.0918**	**0.037**	**0.04**	**0.378**	**0.163**	**0.261**	**0.749 J-**	**0.165**
Zinc	mg/L	NS	5.0	<0.0125 U	<0.0079 U	**0.0219**	<0.0131 U	**0.0623**	**0.063**	<0.005 U	<0.005 U	**0.145**	**0.0172 J**	**0.0179 B**	**0.0253**	**1.66**	**1.63**	**0.455**	NA	NA	NA	NA
Inorganics																						
Cyanide	mg/L	0.2	0.2	<0.01 U	NA	<0.01 U	NA	<0.01 U	NA	<0.005 U	<0.005 U	<0.01 U	NA	<0.01 U	<0.01 U	<0.005 U	<0.005 U	<0.005 U	NA	NA	NA	NA
Sulfide	mg/L	NS	NS	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.05 U	<0.05 U	<0.001 U	NA	<0.001 U	<0.001 U	<0.05 U	<0.05 U	<0.05 U	NA	NA	NA	NA

Notes:
1. Bolded cells indicate detection
2. D=Deep
3. S=Shallow
4. NA=Not Analyzed
5. Units for VOCs and SVOCs are µg/L
6. Units for metals & inorganics are mg/L
7. Shaded cells indicate exceedance of MCL or Illinois Class I Groundwater Standard
8. NS=No Standard for MCL values or Illinois Class I Groundwater
9. R=Replacement
10. DUP=Duplicate Sample
11. MCLs can be found at http://www.epa.gov/safewater/contaminants/index.html
12. This table includes analytical results for parameters detected at any time at the Site. If a parameter was never detected it is not included.
13. The Illinois Class I Groundwater Standards are located in Section 620.410 of Title 35 of the Illinois Administrative Code

Data Qualifiers:
1. U indicates the analyte was analyzed for, but was not detected above the report sample quantitation limit
2. UJ indicates the analyte was not detected above the reported sample quantitation limit, however, the reported quantitation limit is approximate
3. J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
4. B indicates the analyte result was between IDL (instrument detection limit) and contract required detection limit
5. N indicates spiked sample recovery not within control limits
6. J- indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a low bias
7. J+ indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a high bias

Table 3-4
Summary of Historical Groundwater Analytical Detections
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Location				MW-12D											
Date Sampled	Units	MCL	IL Class I GW Standard	9/1/1995	9/1/1995-DUP	11/1/1995	11/1/1995-DUP	4/9/2010	4/9/2010-DUP	12/1/2010	12/28/2011	12/28/2011-DUP	7/18/2012	1/9/2013	7/24/2013
VOC															
1,1,1-Trichloroethane	µg/L	200	200	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	NA
1,1-Dichloroethane	µg/L	NS	700	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	NA
1,1-Dichloroethene	µg/L	7	7	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5
1,2-Dibromo-3-chloropropane	µg/L	0.2	0.2	NA	NA	<1 U	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	NA
1,2-Dichloroethane	µg/L	5	5	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	NA
1,2-Dichloroethene (Total)	µg/L	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	µg/L	5	5	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5
1,4-Dioxane	µg/L	NS	NS	NA	NA	NA	NA	<400 UJ	<400 UJ	<400 UJ	NA	NA	NA	NA	NA
Acetone	µg/L	NS	6300	NA	NA	NA	NA	<100 UJ	<100 UJ	<100 UJ	NA	NA	NA	NA	NA
Benzene	µg/L	5	5	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5
Bromomethane	µg/L	NS	9.8	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	NA
Carbon disulfide	µg/L	NS	700	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	NA
Chlorobenzene	µg/L	100	100	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	NA	NA	NA	NA	NA
Chloroethane	µg/L	NS	NS	<1 U	NA	<1 U	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	NA
Chloroform	µg/L	80	0.2	<1 U	NA	<1 U	NA	<1 UJ	<1 UJ	<1 UJ	NA	NA	NA	NA	NA
Chloromethane	µg/L	NS	NS	<1 U	NA	<1 U	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	µg/L	70	70	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	NA
Ethyl benzene	µg/L	700	700	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	NA
Methylene chloride	µg/L	5	5	<2 U	NA	<2 U	NA	<5 UJ	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5
Tetrachloroethene	µg/L	5	5	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5
Toluene	µg/L	1000	1000	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	µg/L	100	100	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	NA
Trichloroethene	µg/L	5	5	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5
Vinyl chloride	µg/L	2	2	<1 U	NA	<1 U	NA	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ
Xylene, Total	µg/L	10000	10000	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	NA
SVOC															
2-Methylnaphthalene	µg/L	NS	NS	NA	NA	NA	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	NA
2-Methylphenol	µg/L	NS	350	NA	NA	NA	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	µg/L	6	6	NA	NA	NA	NA	<5 UJ	<5 UJ	<5 UJ	NA	NA	NA	NA	NA
Diethylphthalate	µg/L	NS	5600	NA	NA	NA	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	NA
Di-n-butylphthalate	µg/L	NS	700	NA	NA	NA	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	NA
Naphthalene	µg/L	NS	140	NA	NA	NA	NA	<10 UJ	<10 UJ	<10 UJ	NA	NA	NA	NA	NA
Metals															
Antimony	mg/L	0.006	0.006	<0.001 U	<0.001 U	<0.001 U	<0.001 UN	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006
Arsenic	mg/L	0.010	0.05	**0.0087 B**	**0.0078 B**	<0.001 U	**0.0085 B**	<0.002 U	<0.002 U	**0.015**	**0.017**	**0.017**	**0.018 J**	**0.015 J-**	**0.009**
Barium	mg/L	2.0	2.0	**0.297**	**0.278**	**0.424**	**0.273**	**0.338**	**0.332**	**0.348**	NA	NA	NA	NA	NA
Boron	mg/L	NS	2.0	**0.0125 B**	NA	**0.0132 B**	NA	<0.01 UJ	<0.01 UJ	**0.02 J-**	**0.02**	**0.02**	**0.02**	**0.01**	**0.02**
Chromium	mg/L	0.1	0.1	**0.002 B**	<0.001 U	**0.002 B**	<0.003 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001
Cobalt	mg/L	NS	1.0	<0.001 U	<0.001 U	<0.001 U	<0.004 U	<0.001 U	<0.001 U	<0.001 U	NA	NA	NA	NA	NA
Copper	mg/L	1.3	0.65	<0.002 U	<0.002 U	**0.0021 B**	**0.0037 B**	<0.001 U	<0.001 U	**0.002**	NA	NA	NA	NA	NA
Iron	mg/L	NS	5.0	**0.933**	**0.0946 B**	**0.326**	**0.146**	**0.49 J**	**0.45 J**	**0.56**	**0.48**	**0.47**	**0.49**	**0.48**	**0.28**
Lead	mg/L	0.015	0.0075	**0.0032**	**0.0037**	**0.0127**	**0.0082**	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002
Manganese	mg/L	NS	0.15	**0.237**	**0.207**	**0.249**	**0.194**	**0.166**	**0.164**	**0.176**	**0.183**	**0.179**	**0.209**	**0.181**	**0.197**
Mercury	mg/L	0.002	0.002	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005
Nickel	mg/L	NS	0.1	**0.0033 B**	**0.0023 B**	**0.009 B**	<0.011 U	<0.001 U	<0.001 U	**0.002**	**0.001**	<0.001 U	<0.001 U	<0.001 UJ	**0.002**
Zinc	mg/L	NS	5.0	**0.0089 B**	**0.0106 B**	**0.0192 B**	**0.0096 B**	<0.005 U	<0.005 U	<0.005 U	NA	NA	NA	NA	NA
Inorganics															
Cyanide	mg/L	0.2	0.2	<0.01 U	NA	<0.01 U	NA	<0.005 U	<0.005 U	<0.005 U	NA	NA	NA	NA	NA
Sulfide	mg/L	NS	NS	<0.001 U	NA	<0.001 U	NA	<0.05 U	<0.05 U	<0.05 U	NA	NA	NA	NA	NA

Location	MW-12S									
Date Sampled	9/1/1995	9/1/1995-DUP	11/1/1995	11/1/1995-DUP	4/9/2010	12/3/2010	12/28/2011	7/18/2012	1/9/2013	7/24/2013
VOC										
1,1,1-Trichloroethane	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
1,1-Dichloroethane	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
1,1-Dichloroethene	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5
1,2-Dibromo-3-chloropropane	NA	NA	<1 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
1,2-Dichloroethane	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
1,2-Dichloroethene (Total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5
1,4-Dioxane	NA	NA	NA	NA	<400 UJ	<400 UJ	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	<100 UJ	<100 UJ	NA	NA	NA	NA
Benzene	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5
Bromomethane	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Carbon disulfide	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Chlorobenzene	<1 U	NA	<1 U	NA	<5 U	<5 U	NA	NA	NA	NA
Chloroethane	<1 U	NA	<1 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
Chloroform	<1 U	NA	<1 U	NA	<1 UJ	<1 UJ	NA	NA	NA	NA
Chloromethane	<1 U	NA	<1 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
cis-1,2-Dichloroethene	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Ethyl benzene	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Methylene chloride	<2 U	NA	<2 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5
Tetrachloroethene	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5
Toluene	<1 U	NA	<1 U	NA	<5 U	<5 U	NA	NA	NA	NA
trans-1,2-Dichloroethene	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Trichloroethene	<1 U	NA	<1 U	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5
Vinyl chloride	<1 U	NA	<1 U	NA	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ
Xylene, Total	<1 U	NA	<1 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
SVOC										
2-Methylnaphthalene	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
2-Methylphenol	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	<10 U	NA	<10 U	NA	<5 UJ	<5 UJ	NA	NA	NA	NA
Diethylphthalate	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
Di-n-butylphthalate	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
Naphthalene	<10 U	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA	NA
Metals										
Antimony	<0.001 U	<0.001 U	<0.001 U	<0.001 UN	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006
Arsenic	<0.003 U	<0.003 U	<0.001 U	<0.001 U	<0.002 U	<0.002 U	<0.002 U	<0.002 UJ	<0.002 UJ	<0.002
Barium	**0.1 B**	**0.0982 B**	**0.051**	**0.026**	**0.092**	**0.145**	NA	NA	NA	NA
Boron	**0.278**	NA	**0.157**	NA	**0.08 J**	**0.11 J-**	**0.09**	**0.12**	**0.1**	**0.06**
Chromium	<0.001 U	<0.001 U	<0.001 U	<0.003 U	<0.001 U	**0.001**	<0.001 U	<0.001 U	**0.003**	<0.001
Cobalt	<0.001 U	<0.001 U	<0.001 U	<0.004 U	<0.001 U	<0.001 U	NA	NA	NA	NA
Copper	<0.002 U	<0.002 U	<0.001 U	**0.0044 B**	<0.001 U	**0.003**	NA	NA	NA	NA
Iron	<0.015 U	<0.015 U	<0.01 U	**0.0548 B**	**2.82 J**	**0.48**	**1.63**	**2.48**	**2.19**	**0.1**
Lead	<0.002 U	**0.0032**	<0.016 U	<0.016 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002
Manganese	**0.388**	**0.4**	**0.0051 B**	**0.0023 B**	**0.737**	**0.64**	**0.176**	**0.173**	**1.06**	**0.539**
Mercury	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	U	<0.0002 U	<0.0005 UJ	UJ	<0.0005 UJ	<0.0005
Nickel	**0.0117 B**	**0.0112 B**	**0.0058 B**	<0.011 U	**0.005**	**0.011**	**0.004**	**0.004**	**0.018 J-**	**0.004**
Zinc	**0.0098 B**	**0.0046 B**	**0.0011 B**	**0.0126 B**	**0.969**	**1.4**	NA	NA	NA	NA
Inorganics										
Cyanide	<0.01 U	NA	<0.01 U	NA	<0.005 U	<0.005 U	NA	NA	NA	NA
Sulfide	<0.001 U	NA	<0.001 U	NA	<0.05 U	<0.05 U	NA	NA	NA	NA

Notes:
1. Bolded cells indicate detection
2. D=Deep
3. S=Shallow
4. NA=Not Analyzed
5. Units for VOCs and SVOCs are µg/L
6. Units for metals & inorganics are mg/L
7. Shaded cells indicate exceedance of MCL or Illinois Class I Groundwater Standard
8. NS=No Standard for MCL values or Illinois Class I Groundwater
9. R=Replacement
10. DUP=Duplicate Sample
11. MCLs can be found at http://www.epa.gov/safewater/contaminants/index.html
12. This table includes analytical results for parameters detected at any time at the Site. If a parameter was never detected it is not included.
13. The Illinois Class I Groundwater Standards are located in Section 620.410 of Title 35 of the Illinois Administrative Code

Data Qualifiers:
1. U indicates the analyte was analyzed for, but was not detected above the report sample quantitation limit
2. UJ indicates the analyte was not detected above the reported sample quantitation limit, however, the reported quantitation limit is approximate
3. J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
4. B indicates the analyte result was between IDL (instrument detection limit) and contract required detection limit
5. N indicates spiked sample recovery not within control limits
6. J- indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a low bias
7. J+ indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a high bias

Table 3-4
Summary of Historical Groundwater Analytical Detections
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Location				MW-13														MW-14				
Date Sampled	Units	MCL	IL Class I GW Standard	9/1/1995	9/1/1995-DUP	11/1/1995	11/1/1995-DUP	2/1/2000	11/1/2006	11/1/2006-DUP	4/12/2010	12/8/2010	12/27/2011	12/27/2011-DUP	7/18/2012	1/9/2013	7/24/2013	9/1/1995	9/1/1995-DUP	11/1/1995	11/1/1995-DUP	2/1/2000
VOC																						
1,1,1-Trichloroethane	µg/L	200	200	<5 U	NA	<5 U	NA	<1 U	<5 U	<5 U	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	<2 U	<2 U	<2 U	NA	<1 U
1,1-Dichloroethane	µg/L	NS	700	**26**	NA	**17**	NA	**7**	NA	NA	<5 UJ	**5.5**	NA	NA	NA	NA	NA	**23**	**25**	**22**	NA	**2**
1,1-Dichloroethene	µg/L	7	7	<5 U	NA	**0.6 J**	NA	<1 U	NA	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<2 U	<2 U	<2 U	NA	<1 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	0.2	NA	NA	<5 U	NA	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	NA	<2 U	NA	NA
1,2-Dichloroethane	µg/L	5	5	<5 U	NA	<5 U	NA	<1 U	<5 U	<5 U	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	<2.5 U	<2.5 U	<2 U	NA	<1 U
1,2-Dichloroethene (Total)	µg/L	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	µg/L	5	5	**5**	NA	**3 J**	NA	**2**	<5 U	<5 U	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5	**10**	**10**	**8**	NA	**2**
1,4-Dioxane	µg/L	NS	NS	NA	NA	NA	NA	NA	NA	NA	<400 UJ	<400 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	µg/L	NS	6300	NA	NA	NA	NA	NA	NA	NA	<100 UJ	<100 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	µg/L	5	5	**11**	NA	**7**	NA	**4**	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5	**4**	**4**	**4**	NA	<1 U
Bromomethane	µg/L	NS	9.8	<5 U	NA	<5 U	NA	<1 U	NA	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	<2 U	<2 U	<2 U	NA	<1 U
Carbon disulfide	µg/L	NS	700	<5 U	NA	**0.6 J**	NA	<5 U	NA	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	<2 U	<2 U	<2 U	NA	<5 U
Chlorobenzene	µg/L	100	100	**2 J**	NA	**2 J**	NA	<1 U	NA	NA	<5 U	<5 U	NA	NA	NA	NA	NA	**3**	**4**	**3**	NA	<1 U
Chloroethane	µg/L	NS	NS	**4 J**	NA	**3 J**	NA	**1**	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	**0.6 J**	**0.8 J**	**0.7 J**	NA	<1 U
Chloroform	µg/L	80	0.2	<5 U	NA	<5 U	NA	<1 U	NA	NA	<1 UJ	<1 UJ	NA	NA	NA	NA	NA	<2 U	<2 U	<2 U	NA	<1 U
Chloromethane	µg/L	NS	NS	<5 U	NA	**0.5 J**	NA	<1 U	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	<2 U	<2 U	<2 U	NA	<1 U
cis-1,2-Dichloroethene	µg/L	70	70	**54**	NA	**38**	NA	**12**	NA	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	**28**	**30**	**40**	NA	**4**
Ethyl benzene	µg/L	700	700	**14**	NA	**12**	NA	<1 U	<5 U	<5 U	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	<2 U	<2 U	<2 U	NA	<1 U
Methylene chloride	µg/L	5	5	<10 U	NA	<10 U	NA	<2 U	NA	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5	<5 U	<5 U	<4 U	NA	<2 U
Tetrachloroethene	µg/L	5	5	**0.2 J**	NA	<5 U	NA	<1 U	NA	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5	**7**	**7**	**7**	NA	<1 U
Toluene	µg/L	1000	1000	**47**	NA	**54**	NA	<1 U	<5 U	<5 U	<5 U	<5 U	NA	NA	NA	NA	NA	<2 U	<2 U	<2 U	NA	<1 U
trans-1,2-Dichloroethene	µg/L	100	100	**2 J**	NA	**2 J**	NA	<1 U	NA	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	**2 J**	**2 J**	**2**	NA	<1 U
Trichloroethene	µg/L	5	5	**4 J**	NA	**3 J**	NA	**4**	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5	**7**	**7**	**10**	NA	<1 U
Vinyl chloride	µg/L	2	2	**12**	NA	**5**	NA	**1**	<2 U	<2 U	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	**10**	**11**	**10**	NA	<1 U
Xylene, Total	µg/L	10000	10000	**32**	NA	**33**	NA	<1 U	<5 U	<5 U	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	<2 U	<2 U	<2 U	NA	<1 U
SVOC																						
2-Methylnaphthalene	µg/L	NS	NS	<10 U	NA	<10 U	NA	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	NA
2-Methylphenol	µg/L	NS	350	**0.9 J**	NA	**1 J**	NA	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	NA
bis(2-Ethylhexyl) phthalate	µg/L	6	6	**8 J**	NA	<10 U	NA	NA	NA	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	NA
Diethylphthalate	µg/L	NS	5600	<10 U	NA	<10 U	NA	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	NA
Di-n-butylphthalate	µg/L	NS	700	<10 U	NA	<10 U	NA	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	NA
Naphthalene	µg/L	NS	140	<10 U	NA	<10 U	NA	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA	NA
Metals																						
Antimony	mg/L	0.006	0.006	<0.001 U	<0.001 UN	<0.001 U	<0.001 UN	NA	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006	<0.001 UJ	<0.001 U	<0.001 U	<0.001 UN	NA
Arsenic	mg/L	0.010	0.05	**0.0458**	**0.0504**	**0.05**	**0.0486**	NA	**0.044**	**0.046**	**0.038**	**0.036**	**0.044**	**0.044**	**0.035 J**	**0.039 J-**	**0.036**	<0.003 U	<0.003 U	**0.0021 B**	**0.0022 B**	NA
Barium	mg/L	2.0	2.0	**0.53**	**0.534**	**0.481**	**0.507**	NA	NA	NA	**0.151**	**0.169**	NA	NA	NA	NA	NA	**0.184 B**	**0.184 B**	**0.166 B**	**0.173 B**	NA
Boron	mg/L	NS	2.0	**0.581**	NA	**0.506**	NA	NA	**0.4**	**0.42**	**0.34 J**	**0.43 J-**	**0.63**	**0.60**	**0.56**	**0.66**	**0.44**	**0.135**	**0.133**	**0.0955 B**	NA	NA
Chromium	mg/L	0.1	0.1	**0.0057 B**	<0.003 U	**0.002 B**	<0.003 U	NA	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001	<0.001 U	<0.001 U	**0.0022 B**	**0.004 B**	NA
Cobalt	mg/L	NS	1.0	**0.0322 B**	**0.0299 B**	**0.0288 B**	**0.0279 B**	NA	NA	NA	**0.007**	**0.006**	NA	NA	NA	NA	NA	**0.0064 B**	**0.0064 B**	**0.0042 B**	**0.0053 B**	NA
Copper	mg/L	1.3	0.65	<0.006 U	<0.006 U	**0.0028 B**	<0.003 U	NA	NA	NA	<0.001 U	**0.002**	NA	NA	NA	NA	NA	<0.002 U	<0.002 U	**0.002 B**	**0.0049 B**	NA
Iron	mg/L	NS	5.0	**29.9**	**28.5**	**25.5**	**23.1**	NA	**8.01**	**8.36**	**6.12 J**	**6.25**	**8.90**	**8.33**	**6.79**	**8.28**	**5.94**	**0.973**	**0.96**	**1.53**	**1.55**	NA
Lead	mg/L	0.015	0.0075	**0.0028 B**	<0.0034 U	**0.0104**	**0.007**	NA	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002	<0.002 U	<0.002 U	**0.0101**	**0.0191**	NA
Manganese	mg/L	NS	0.15	**0.172**	**0.166**	**0.147**	**0.139**	NA	**0.056**	**0.056**	**0.054**	**0.057**	**0.079**	**0.074**	**0.071**	**0.084**	**0.054**	**0.603**	**0.6**	**0.47**	**0.456**	NA
Mercury	mg/L	0.002	0.002	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	NA	<0.0005 U	<0.0005 U	<0.0002 U	<0.0002 U	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	NA
Nickel	mg/L	NS	0.1	**0.0993**	**0.0954**	**0.0874**	**0.0824**	NA	**0.062**	**0.064**	**0.041**	**0.053**	**0.075**	**0.072**	**0.068**	**0.105 J-**	**0.053**	**0.0259 B**	**0.026 B**	**0.0179 B**	**0.0144 B**	NA
Zinc	mg/L	NS	5.0	**0.03**	**0.105 J**	**0.0253**	**0.0215**	NA	NA	NA	**0.03**	**0.012**	NA	NA	NA	NA	NA	**0.0073 B**	**0.0092 B**	**0.0154 B**	**0.0183 B**	NA
Inorganics																						
Cyanide	mg/L	0.2	0.2	<0.01 U	NA	<0.01 U	NA	NA	NA	NA	<0.005 U	<0.005 U	NA	NA	NA	NA	NA	<0.01 U	<0.01 U	<0.01 U	NA	NA
Sulfide	mg/L	NS	NS	<0.001 U	NA	<0.001 U	NA	NA	NA	NA	<0.05 U	<0.05 U	NA	NA	NA	NA	NA	<0.001 U	<0.001 U	<0.001 U	NA	NA

Notes:
1. Bolded cells indicate detection
2. D=Deep
3. S=Shallow
4. NA=Not Analyzed
5. Units for VOCs and SVOCs are µg/L
6. Units for metals & inorganics are mg/L
7. Shaded cells indicate exceedance of MCL or Illinois Class I Groundwater Standard
8. NS=No Standard for MCL values or Illinois Class I Groundwater
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12. This table includes analytical results for parameters detected at any time at the Site. If a parameter was never detected it is not included.
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3. J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
4. B indicates the analyte result was between IDL (instrument detection limit) and contract required detection limit
5. N indicates spiked sample recovery not within control limits
6. J- indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a low bias
7. J+ indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a high bias

Table 3-4
Summary of Historical Groundwater Analytical Detections
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Ge

Location				MW-14										MW-15									M
Date Sampled	Units	MCL	IL Class I GW Standard	11/1/2006	4/12/2010	12/8/2010	12/27/2011	7/18/2012	7/18/2012-DUP	1/9/2013	1/9/2013-Dup	7/24/2013	7/24/2013-Dup	9/1/1995	9/1/1995-DUP	11/1/1995	11/1/1995-DUP	4/13/2010	12/3/2010	12/28/2011	7/17/2012	7/23/2013	11/1/1995
VOC																							
1,1,1-Trichloroethane	µg/L	200	200	<5 U	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	NA	<2 U	NA	<2 U	NA	<5 UJ	<5 UJ	NA	NA	NA	<2 U
1,1-Dichloroethane	µg/L	NS	700	<5 U	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	NA	**18**	NA	**16**	NA	<5 UJ	<5 UJ	NA	NA	NA	**27**
1,1-Dichloroethene	µg/L	7	7	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<5	**1 J**	NA	**1 J**	NA	<5 U	<5 U	<5 U	<5 U	<5	<2 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	0.2	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	<2 U	NA	<10 UJ	<10 UJ	NA	NA	NA	**0.2 J**
1,2-Dichloroethane	µg/L	5	5	<5 U	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	NA	<2 U	NA	<2 U	NA	<5 UJ	<5 UJ	NA	NA	NA	<3 U
1,2-Dichloroethene (Total)	µg/L	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	µg/L	5	5	<5 U	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<5	**2 J**	NA	**2**	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5	**5**
1,4-Dioxane	µg/L	NS	NS	NA	<400 UJ	<400 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**420 J**	<400 UJ	NA	NA	NA	NA
Acetone	µg/L	NS	6300	NA	<100 UJ	<100 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<100 UJ	<100 UJ	NA	NA	NA	NA
Benzene	µg/L	5	5	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<5	**12**	NA	**12**	NA	<5 U	<5 U	<5 U	<5 U	<5	**4**
Bromomethane	µg/L	NS	9.8	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	NA	<2 U	NA	<2 U	NA	<5 UJ	<5 UJ	NA	NA	NA	<2 U
Carbon disulfide	µg/L	NS	700	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	NA	<2 U	NA	<2 U	NA	<5 UJ	<5 UJ	NA	NA	NA	<2 U
Chlorobenzene	µg/L	100	100	NA	<5 U	<5 U	NA	NA	NA	NA	NA	NA	NA	**1 J**	NA	**1 J**	NA	<5 U	<5 U	NA	NA	NA	<2 U
Chloroethane	µg/L	NS	NS	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	NA	**3**	NA	**4**	NA	<10 UJ	<10 UJ	NA	NA	NA	**25**
Chloroform	µg/L	80	0.2	NA	<1 UJ	<1 UJ	NA	NA	NA	NA	NA	NA	NA	<2 U	NA	**0.4 J**	NA	<1 UJ	<1 UJ	NA	NA	NA	**0.4 J**
Chloromethane	µg/L	NS	NS	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	NA	<2 U	NA	**0.2 J**	NA	<10 UJ	<10 UJ	NA	NA	NA	**3**
cis-1,2-Dichloroethene	µg/L	70	70	<5 U	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	NA	**20**	NA	**17**	NA	<5 UJ	<5 UJ	NA	NA	NA	**1 J**
Ethyl benzene	µg/L	700	700	<5 U	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	NA	**2**	NA	**4**	NA	<5 UJ	<5 UJ	NA	NA	NA	<2 U
Methylene chloride	µg/L	5	5	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<5	<4 U	NA	<4 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5	<4 U
Tetrachloroethene	µg/L	5	5	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<5	**0.2 J**	NA	<2 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5	<2 U
Toluene	µg/L	1000	1000	<5 U	<5 U	<5 U	NA	NA	NA	NA	NA	NA	NA	**0.9 J**	NA	**0.5 J**	NA	<5 U	<5 U	NA	NA	NA	<2 U
trans-1,2-Dichloroethene	µg/L	100	100	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	NA	**1 J**	NA	**1 J**	NA	<5 UJ	<5 UJ	NA	NA	NA	**1 J**
Trichloroethene	µg/L	5	5	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5	<5	**6**	NA	**6**	NA	<5 U	<5 U	<5 U	<5 U	<5	**0.6 J**
Vinyl chloride	µg/L	2	2	<2 U	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	**24**	NA	**28**	NA	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	**3**
Xylene, Total	µg/L	10000	10000	<5 U	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	NA	**2 J**	NA	**2**	NA	<5 UJ	<5 UJ	NA	NA	NA	<2 U
SVOC																							
2-Methylnaphthalene	µg/L	NS	NS	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	<10 U
2-Methylphenol	µg/L	NS	350	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	<10 U
bis(2-Ethylhexyl) phthalate	µg/L	6	6	NA	<5 UJ	<5 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5 UJ	<5 UJ	NA	NA	NA	<10 U
Diethylphthalate	µg/L	NS	5600	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	<10 U
Di-n-butylphthalate	µg/L	NS	700	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	<10 U
Naphthalene	µg/L	NS	140	NA	<10 UJ	<10 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10 UJ	<10 UJ	NA	NA	NA	<10 U
Metals																							
Antimony	mg/L	0.006	0.006	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006	<0.006	<0.001 U	<0.001 U	<0.001 UJ	<0.001 UN	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006	<0.001 U
Arsenic	mg/L	0.010	0.05	**0.021 B**	**0.02**	**0.011**	**0.020**	**0.010 J**	**0.012 J**	**0.018 J-**	**0.019 J-**	**0.005**	**0.006**	**0.0385**	**0.0406**	**0.039**	**0.0377**	**0.034**	**0.039**	**0.034**	**0.34 J**	**0.032**	**0.0299**
Barium	mg/L	2.0	2.0	NA	**0.141**	**0.136**	NA	NA	NA	NA	NA	NA	NA	**0.286**	**0.264**	**0.286**	**0.277**	**0.316**	**0.646**	NA	NA	NA	**0.341**
Boron	mg/L	NS	2.0	**0.09**	**0.19 J**	**0.22 J-**	**0.23**	**0.02**	**0.25**	**0.15**	**0.16**	**0.11**	**0.11**	**2.38**	NA	**2.59**	NA	**2.03 J**	**3.13 J-**	**2.78**	**2.57**	**2.24**	**0.431**
Chromium	mg/L	0.1	0.1	**0.002**	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001	<0.001	<0.003 U	**0.0034 B**	**0.0048 B**	<0.003 U	<0.001 U	<0.001 U	**0.001**	**0.001**	<0.001	**0.0024 B**
Cobalt	mg/L	NS	1.0	NA	**0.006**	**0.006**	NA	NA	NA	NA	NA	NA	NA	**0.0114 B**	**0.0114 B**	**0.0126 B**	**0.0141 B**	**0.009**	**0.017**	NA	NA	NA	**0.0052 B**
Copper	mg/L	1.3	0.65	NA	<0.001 U	**0.002**	NA	NA	NA	NA	NA	NA	NA	<0.006 U	<0.006 U	**0.0017 B**	<0.003 U	<0.001 U	<0.001 U	NA	NA	NA	**0.0028 B**
Iron	mg/L	NS	5.0	**4.78**	**5.61 J**	**6.49**	**4.89**	**3.88**	**4.38**	**3.96**	**4.1**	**1.24**	**1.52**	**18.3**	**16.6**	**17.5**	**16.2**	**13 J**	**21.1**	**13.1**	**13.5**	**9.58**	**9.92**
Lead	mg/L	0.015	0.0075	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002	<0.002	**0.0022 B**	<0.002 U	**0.127**	**0.0019 B**	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002	**0.0079**
Manganese	mg/L	NS	0.15	**0.257**	**0.292**	**0.313**	**0.181**	**0.220 J+**	**0.249**	**0.349**	**0.362**	**0.01**	**0.01**	**0.168**	**0.162**	**0.164**	**0.155**	**0.208**	**0.391**	**0.239**	**0.239**	**0.173**	**0.78**
Mercury	mg/L	0.002	0.002	<0.0005 U	<0.0002 U	<0.0002 U	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005 UJ	<0.0005	<0.0005	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0005 UJ	<0.0005 UJ	<0.0005	<0.0002 U
Nickel	mg/L	NS	0.1	**0.017**	**0.024**	**0.03**	**0.029**	**0.3**	**0.34**	**0.042 J-**	**0.044 J-**	**0.021**	**0.023**	**0.201**	**0.201**	**0.243**	**0.234**	**0.116**	**0.268**	**0.219**	**0.199**	**0.172**	**0.0779**
Zinc	mg/L	NS	5.0	NA	**0.053**	**0.025**	NA	NA	NA	NA	NA	NA	NA	**0.062**	**0.0426 J**	**0.0198 B**	**0.016 B**	<0.005 U	<0.005 U	NA	NA	NA	**0.0275**
Inorganics																							
Cyanide	mg/L	0.2	0.2	NA	<0.005 U	<0.005 U	NA	NA	NA	NA	NA	NA	NA	<0.01 U	NA	<0.01 U	NA	<0.005 U	<0.005 U	NA	NA	NA	<0.01 U
Sulfide	mg/L	NS	NS	NA	<0.05 U	<0.05 U	NA	NA	NA	NA	NA	NA	NA	<0.001 U	NA	<0.001 U	NA	<0.05 U	<0.05 U	NA	NA	NA	<0.001 U

Notes:
1. Bolded cells indicate detection
2. D=Deep
3. S=Shallow
4. NA=Not Analyzed
5. Units for VOCs and SVOCs are µg/L
6. Units for metals & inorganics are mg/L
7. Shaded cells indicate exceedance of MCL or Illinois Class I Groundwater Standard
8. NS=No Standard for MCL values or Illinois Class I Groundwater
9. R=Replacement
10. DUP=Duplicate Sample
11. MCLs can be found at http://www.epa.gov/safewater/contaminants/index.html
12. This table includes analytical results for parameters detected at any time at the Site. If a parameter was never detected it is not included.
13. The Illinois Class I Groundwater Standards are located in Section 620.410 of Title 35 of the Illinois Administrative Code

Data Qualifiers:
1. U indicates the analyte was analyzed for, but was not detected above the report sample quantitation limit
2. UJ indicates the analyte was not detected above the reported sample quantitation limit, however, the reported quantitation limit is approximate
3. J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
4. B indicates the analyte result was between IDL (instrument detection limit) and contract required detection limit
5. N indicates spiked sample recovery not within control limits
6. J- indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a low bias
7. J+ indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a high bias

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Table 3-4
Summary of Historical Groundwater Analytical Detections
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Location				W-16	MW-16						
Date Sampled	Units	MCL	IL Class I GW Standard	11/1/1995-DUP	9/1/1995	9/1/1995-DUP	4/13/2010	12/3/2010	12/28/2011	7/17/2012	7/23/2013
VOC											
1,1,1-Trichloroethane	µg/L	200	200	<2 U	<2 U	NA	<5 UJ	<5 UJ	NA	NA	NA
1,1-Dichloroethane	µg/L	NS	700	**27**	**30**	NA	<5 UJ	**5**	NA	NA	NA
1,1-Dichloroethene	µg/L	7	7	<2 U	<2 U	NA	<5 U	<5 U	<5 U	<5 U	<5
1,2-Dibromo-3-chloropropane	µg/L	0.2	0.2	<2 U	NA	NA	<10 UJ	<10 UJ	NA	NA	NA
1,2-Dichloroethane	µg/L	5	5	<3 U	<4 U	NA	<5 UJ	<5 UJ	NA	NA	NA
1,2-Dichloroethene (Total)	µg/L	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	µg/L	5	5	**5**	**6**	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5
1,4-Dioxane	µg/L	NS	NS	NA	NA	NA	<400 UJ	<400 UJ	NA	NA	NA
Acetone	µg/L	NS	6300	NA	NA	NA	<100 UJ	<100 UJ	NA	NA	NA
Benzene	µg/L	5	5	**4**	**5**	NA	<5 U	<5 U	<5 U	<5 U	<5
Bromomethane	µg/L	NS	9.8	**0.3 J**	<2 U	NA	<5 UJ	<5 UJ	NA	NA	NA
Carbon disulfide	µg/L	NS	700	<2 U	<2 U	NA	<5 UJ	<5 UJ	NA	NA	NA
Chlorobenzene	µg/L	100	100	<2 U	<2 U	NA	<5 U	<5 U	NA	NA	NA
Chloroethane	µg/L	NS	NS	**26**	**26**	NA	**16.2 J**	<10 UJ	NA	NA	NA
Chloroform	µg/L	80	0.2	<2 U	<2 U	NA	<1 UJ	<1 UJ	NA	NA	NA
Chloromethane	µg/L	NS	NS	**3**	**5**	NA	<10 UJ	<10 UJ	NA	NA	NA
cis-1,2-Dichloroethene	µg/L	70	70	**1 J**	**0.9 J**	NA	<5 UJ	<5 UJ	NA	NA	NA
Ethyl benzene	µg/L	700	700	**0.4 J**	<2 U	NA	<5 UJ	<5 UJ	NA	NA	NA
Methylene chloride	µg/L	5	5	<4 U	<4 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5
Tetrachloroethene	µg/L	5	5	<2 U	<2 U	NA	<5 UJ	<5 UJ	<5 U	<5 U	<5
Toluene	µg/L	1000	1000	**0.5 J**	<2 U	NA	<5 U	<5 U	NA	NA	NA
trans-1,2-Dichloroethene	µg/L	100	100	**1 J**	**2 J**	NA	<5 UJ	<5 UJ	NA	NA	NA
Trichloroethene	µg/L	5	5	**0.7 J**	**0.7 J**	NA	<5 U	<5 U	<5 U	<5 U	<5
Vinyl chloride	µg/L	2	2	**3**	**3**	NA	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ
Xylene, Total	µg/L	10000	10000	**2 J**	<2 U	NA	<5 UJ	<5 UJ	NA	NA	NA
SVOC											
2-Methylnaphthalene	µg/L	NS	NS	NA	**5 J**	NA	<10 UJ	<10 UJ	NA	NA	NA
2-Methylphenol	µg/L	NS	350	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA
bis(2-Ethylhexyl) phthalate	µg/L	6	6	NA	**24**	NA	<5 UJ	<5 UJ	NA	NA	NA
Diethylphthalate	µg/L	NS	5600	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA
Di-n-butylphthalate	µg/L	NS	700	NA	<10 U	NA	<10 UJ	<10 UJ	NA	NA	NA
Naphthalene	µg/L	NS	140	NA	**2 J**	NA	<10 UJ	<10 UJ	NA	NA	NA
Metals											
Antimony	mg/L	0.006	0.006	**0.0093 B**	<0.001 U	<0.001 U	<0.006 U	<0.006 U	<0.006 U	<0.006 U	<0.006
Arsenic	mg/L	0.010	0.05	**0.0288**	**0.0213**	**0.0244**	**0.014**	**0.015**	**0.013**	**0.037 J**	**0.018**
Barium	mg/L	2.0	2.0	**0.269**	**0.343**	**0.333**	**0.248**	**0.278**	NA	NA	NA
Boron	mg/L	NS	2.0	NA	**0.447**	NA	**0.85 J**	**0.74 J-**	**0.68**	**0.8**	**0.56**
Chromium	mg/L	0.1	0.1	**0.004 B**	<0.003 U	<0.003 U	<0.001 U	<0.001 U	**0.002**	<0.001 U	<0.001
Cobalt	mg/L	NS	1.0	**0.0057 B**	**0.0044 B**	**0.0054 B**	**0.007**	**0.006**	NA	NA	NA
Copper	mg/L	1.3	0.65	<0.003 U	<0.006 U	<0.006 U	<0.001 U	<0.001 U	NA	NA	NA
Iron	mg/L	NS	5.0	**9.18**	**9.81**	**9.7**	**8.01 J**	**7.5**	**5.54**	**22.6**	**7.46**
Lead	mg/L	0.015	0.0075	**0.0144**	**0.0024 B**	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002
Manganese	mg/L	NS	0.15	**0.728**	**1.18**	**1.13**	**0.996**	**1.17**	**0.883**	**0.373**	**1.12**
Mercury	mg/L	0.002	0.002	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0005 UJ	<0.0005 UJ	<0.0005
Nickel	mg/L	NS	0.1	**0.0728**	**0.0735**	**0.0689**	**0.118**	**0.137**	**0.111**	**0.065**	**0.082**
Zinc	mg/L	NS	5.0	**0.0278**	**0.0432**	**0.0939 J**	<0.005 U	**0.947**	NA	NA	NA
Inorganics											
Cyanide	mg/L	0.2	0.2	NA	<0.01 U	NA	<0.005 U	<0.005 U	NA	NA	NA
Sulfide	mg/L	NS	NS	NA	<0.001 U	NA	<0.05 U	<0.05 U	NA	NA	NA

Location	GP-11	GP-12	GP-15		GP-20	GP-22			GP-23	GP-24	GP-25	
Date Sampled	2/16/2000	2/16/2000	2/16/2000	11/21/2006	2/16/2000	2/16/2000	2/16/2000-DUP	11/21/2006	2/16/2000	2/16/200	2/16/2000	11/21/2006
VOC												
1,1,1-Trichloroethane	<1	<1	**22**	**5.8**	<1	<1	<1	<5	<5	<1	<1	<5
1,1-Dichloroethane	<1	**1**	**48**	**6.3**	<1	**29**	**30**	**7**	**5**	<1	<1	<5
1,1-Dichloroethene	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	<5
1,2-Dibromo-3-chloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	<1	<1	**12**	<5	<1	**1**	**1**	<5	<1	<1	<1	<5
1,2-Dichloroethene (Total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	<1	<1	**33**	<5	<1	**5**	**5**	<5	<1	<1	<1	<5
1,4-Dioxane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	<5	<5	<5	<100	<5	<5	<5	<100	<5	<5	<5	<100
Benzene	<1	<1	**9**	<5	<1	**2**	**2**	<5	<1	<1	<1	<5
Bromomethane	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	<5
Carbon disulfide	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	<5
Chloroethane	<1	<1	**4**	<10	<1	**3**	**3**	<10	<1	<1	<1	<10
Chloroform	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloromethane	<1	<1	<1	<10	<1	<1	<1	<10	<1	<1	<1	<10
cis-1,2-Dichloroethene	<1	**1**	**59**	<5	<1	**50**	**53**	<5	<1	**1**	**1**	<5
Ethyl benzene	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	<5
Methylene chloride	<2	<2	<2	<5	<2	<2	<2	<5	<2	<2	<2	<5
Tetrachloroethene	<1	**3**	**10**	<5	<1	<1	<1	<5	<1	<1	<1	<5
Toluene	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	<5
trans-1,2-Dichloroethene	<1	<1	**3**	<1	<1	**2**	**2**	<1	<1	<1	<1	<1
Trichloroethene	<1	**1**	**47**	**8.8**	<1	<1	<1	<5	<1	<1	<1	<5
Vinyl chloride	<1	<1	**6**	<2	**1**	**7**	**7**	<2	<1	<1	<1	<2
Xylene, Total	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	<5
SVOC												
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals												
Antimony	NA	NA	NA	<0.006	NA	NA	NA	<0.006	NA	NA	NA	<0.006
Arsenic	NA	NA	NA	<0.002	NA	NA	NA	<0.002	NA	NA	NA	<0.002
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Boron	NA	NA	NA	**0.03**	NA	NA	NA	**0.07**	NA	NA	NA	**0.02**
Chromium	NA	NA	NA	**0.002**	NA	NA	NA	**0.005**	NA	NA	NA	**0.039**
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	**0.07**	NA	NA	NA	**0.26**	NA	NA	NA	**3.44**
Lead	NA	NA	NA	<0.002	NA	NA	NA	<0.002	NA	NA	NA	**0.004**
Manganese	NA	NA	NA	**0.006**	NA	NA	NA	**0.123**	NA	NA	NA	**0.055**
Mercury	NA	NA	NA	<0.0005	NA	NA	NA	<0.0005	NA	NA	NA	<0.0005
Nickel	NA	NA	NA	**0.004**	NA	NA	NA	**0.014**	NA	NA	NA	**0.035**
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics												
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
1. Bolded cells indicate detection
2. D=Deep
3. S=Shallow
4. NA=Not Analyzed
5. Units for VOCs and SVOCs are µg/L
6. Units for metals & inorganics are mg/L
7. Shaded cells indicate exceedance of MCL or Illinois Class I Groundwater Standard
8. NS=No Standard for MCL values or Illinois Class I Groundwater
9. R=Replacement
10. DUP=Duplicate Sample
11. MCLs can be found at http://www.epa.gov/safewater/contaminants/index.html
12. This table includes analytical results for parameters detected at any time at the Site. If a parameter was never detected it is not included.
13. The Illinois Class I Groundwater Standards are located in Section 620.410 of Title 35 of the Illinois Administrative Code

Data Qualifiers:
1. U indicates the analyte was analyzed for, but was not detected above the report sample quantitation limit
2. UJ indicates the analyte was not detected above the reported sample quantitation limit, however, the reported quantitation limit is approximate
3. J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample
4. B indicates the analyte result was between IDL (instrument detection limit) and contract required detection limit
5. N indicates spiked sample recovery not within control limits
6. J- indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a low bias
7. J+ indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte with a high bias

Table 3-5

Surface Water Quality Criteria and Groundwater Action Levels[1]

MIG/DeWane Landfill Superfund Site
Belvidere, Illinois

Contaminant of Concern (COC)	Acute (mg/L)	Chronic (mg/L)	Human Health (Organisms) (mg/L)	Max. Detected West Pathway (mg/L)	Action Levels West Pathway (mg/L)	Max. Detected North Pathway (mg/L)	Action Level North Pathway (mg/L)
Benzene	5.2	0.42	*0.071	0.11	6.3	0.012	1.37
1,1-Dichloroethylene	3.03	0.242	*0.0032	<0.001	135	0.001	2.3
1,2-Dichlopropane	4.8	0.38	*0.039	0.01	0.85	0.006	0.37
Methylene Chloride	17	1.4	0.34	0.01	13,000	<0.001	10,333
Tetrachloroethylene	1.2	0.15	*0.00885	0.007	0.88	0.002	0.18
Trichloroethylene	12	0.94	*0.081	0.01	2.53	0.006	0.91
Vinyl Chloride	NCE	NCE	*0.525	0.12	10.58	0.028	4.77

* = Value obtained from the 22 December 1992 Federal Register (Vol. 57, No. 245) pages 60911, and 609912.

NCE = No criterion established

[1] Information from this table came from the ROD page 62.

Table 3-6
List of Specifications
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

DIVISION 0: BID DOCUMENTS	
Section 00100	Invitation to Bid
Section 00200	Instructions to Bidders
Section 00300	Available Information
Section 00400	Bid Form
Section 00500	Agreement
Section 00600	Bonding
Section 00720	General Conditions
Section 00730	Supplementary Conditions
Section 00800	Measurement and Payment
DIVISION 1: GENERAL REQUIREMENTS	
Section 01001	Abbreviations
Section 01010	Summary of Work
Section 01030	Construction Management Plan and Construction Operations Plan
Section 01031	Community Relations
Section 01032	Environmental Protection
Section 01060	Regulatory Compliance
Section 01065	Safety, Health, and Emergency Response Requirements
Section 01300	Submittals
Section 01310	Progress Schedules and Project Meetings
Section 01400	Construction Quality Control and Quality Assurance
Section 01500	Construction Facilities and Temporary Controls
Section 01700	Project Record Documents and Closeout
DIVISION 2: SITE WORK	
Section 02100	Surveying
Section 02105	Erosion and Sediment Control
Section 02110	Clearing, Grubbing, and Stripping
Section 02200	Earthwork
Section 02300	Leachate and Gas Collection System
Section 02400	Pipe Abandonment
DIVISION 3: CONCRETE	
Section 03010	Common Work Results for Concrete
Section 03020	Water Tightness Test for Concrete Structures
Section 03030	Concrete Forming
Section 03040	Concrete Accessories
Section 03050	Waterstops
Section 03060	Waterproof Seals
Section 03070	Miscellaneous Joint and Crack Fillers
Section 03080	Reinforcing Steel
Section 03090	Cast-In-Place Concrete
Section 03100	Concrete Finishing
Section 03110	Concrete Curing
Section 03120	Non-shrink Grouting
DIVISION 4: PROCESS INTEGRATION	
Section 04050	Common Work Results for Process Integration
Section 04060	Flushing and Disinfection Of Piping
Section 04070	Leak Testing of Piping
Section 04080	Steel Process Piping
Section 04090	Plastic Process Piping
Section 04100	HDPE Process Piping
Section 04110	Common Work Results for Process Valves
Section 04120	Stainless Steel Process Valves
Section 04130	Plastic and Plastic Lined Process Valves
Section 04140	Air Relief Valves
Section 04200	Level Process Measurement Devices (Tank Level Sensors)
Section 04300	Instrumentation and Control For Process Systems
DIVISION 5: PROCESS GAS & LIQUID HANDLING, PURIFICATION, AND STORAGE EQUIPMENT	
Section 05100	Common Work Results For Process Gas & Liquid Handling, Purification And Storage Equipment
Section 05110	Centrifugal Liquid Pump For the Central Storage Tank
Section 05120	Sump Liquid Pumps for the Underground Tanks
Section 05130	Above Ground Central Storage Tank
Section 05140	Underground Storage Tanks
DIVISION 6: METALS	
Section 06100	Common Work Results for Metals
Section 06150	Metal Grating Stairs and Metal Railings
Section 06170	Metal Gratings
Section 06180	Miscellaneous Metal Supports and Posts

Table 3-7
Preliminary Design List of Drawings
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Drawing Title	Drawing #
Cover Sheet	1
Existing Conditions	2A
Existing Conditions	2B
Potentiometric Map	3A
Potentiometric Map	3B
Zones of Attenuation	4
Geologic Cross Sections	5A
Geologic Cross Sections	5B
Geologic Cross Sections	5C
Leachate and Gas Collection System Plan	6
Leachate and Gas Collection System Profiles	7
Leachate and Gas Collection System Profiles and Details	8
Leachate and Gas Collection System Details - I	9
Leachate and Gas Collection System Details - II	10
Soil Borrow Area Excavation Plan	11
Final Cover Plan	12
Final Cover and Surface Water Management System Plan	13
Surface Water Management System Control Point Plan	14
Surface Water Management System Details - I	15
Surface Water Management System Details - II	16
Surface Water Management System Details - III	17
Surface Water Management System Details - IV	18
Haul Road Details	19
Erosion and Sediment Control Plan	20
Erosion and Sediment Control Details - I	21
Erosion and Sediment Control Details - II	22
Concrete Dike and Truck Pad Plan View, Sections and Details	23
Concrete Dike and Truck Pad Sections and Details	24
Concrete Dike and Truck Pad Details - I	25
Concrete Dike and Truck Pad Details - II	26
Northwest Underground Storage Tank	27
Southeast Underground Storage Tank	28
Above Ground Central Storage Tank Piping Plan	29
Above Ground Central Storage Tank Piping Section	30
Mechanical Details - I	31
Mechanical Details - II	32
Electrical and Controls Details	33
General Notes	34
Control Points I - Final Cover/Leachate Collection System	35
Control Points II - Storm Water Benches	36

Table 3-8

Landfill Dual Phase Gas Probes and Gas Vent Monitoring Data

MIG/DeWane Landfill Superfund Site

Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
DP-01	7/28/2011	16:36	21.3	12.8	11.8
	10/25/2011	10:13	35.8	23.0	8.4
	2/2/2012	11:44	20.9	11.9	14.7
	4/20/2012	10:41	11.0	6.4	18.4
	7/12/2012	8:39	27.1	17.0	9.7
	10/18/2012	12:43	17.7	12.5	14.6
	1/28/2013	10:18	20.1	12.4	12.9
	10/22/2013	11:14	22.0	16.7	11.6
DP-02	7/28/2011	16:32	34.8	20.7	5.0
	10/25/2011	10:10	18.2	9.5	15.6
	2/2/2012	11:45	19.0	13.4	14.3
	4/20/2012	11:06	12.4	4.3	19.4
	7/12/2012	8:41	27.0	14.8	11.4
	10/18/2012	12:52	3.2	2.0	20.1
	1/28/2013	10:28	10.5	5.6	17.2
	10/22/2013	11:01	12.7	8.7	16.5
DP-03	7/28/2011	16:26	61.9	36.6	0.0
	10/25/2011	10:54	63.1	33.9	2.6
	2/2/2012	11:47	15.1	10.4	15.5
	4/20/2012	11:04	53.9	30.3	6.4
	7/12/2012	9:13	66.3	31.6	1.7
	10/18/2012	13:19	49.5	30.2	6.6
	1/28/2013	10:31	61.6	34.5	2.3
	10/22/2013	10:56	63.0	35.4	1.0
DP-04	7/28/2011	16:22	29.4	18.4	5.3
	10/25/2011	9:15	35.5	22.5	9.6
	2/2/2012	12:41	24.3	13.6	12.9
	4/20/2012	08:51	10.4	5.4	18.8
	7/12/2012	7:59	11.5	6.8	15.9
	10/18/2012	13:39	3.0	2.3	20.0
	1/28/2013	10:35	7.0	4.9	18.1
	10/22/2013	10:22	4.7	3.5	19.7

Table 3-8

Landfill Dual Phase Gas Probes and Gas Vent Monitoring Data

MIG/DeWane Landfill Superfund Site

Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
DP-05	7/28/2011	16:45	54.5	25.8	1.3
	10/25/2011	10:00	49.0	22.8	6.6
	2/2/2012	11:30	19.7	12.1	14.6
	4/20/2012	10:51	25.0	11.7	16.2
	7/12/2012	8:47	48.7	20.8	6.1
	10/18/2012	12:59	47.0	24.1	6.5
	1/28/2013	10:40	45.5	22.8	7.2
	10/22/2013	11:26	48.0	24.3	5.7
DP-06	7/28/2011	16:08	39.1	21.2	4.2
	10/25/2011	9:25	33.2	18.6	10.3
	2/12/2012	11:56	6.2	4.3	18.3
	4/20/2012	08:55	30.4	16.0	12.4
	7/12/2012	9:17	32.6	16.1	10.2
	10/18/2012	13:24	7.5	4.3	18.7
	1/28/2013	10:49	29.6	18.9	10.8
	10/22/2013	10:44	30.0	19.5	10.5
DP-07	7/28/2011	16:40	46.4	22.4	2.6
	10/25/2011	10:06	45.7	20.6	7.7
	2/2/2012	11:39	30.7	17.3	11.3
	4/20/2012	10:45	31.4	16.2	14.0
	7/12/2012	8:43	39.1	17.3	8.7
	10/18/2012	12:53	24.4	12.8	13.3
	1/28/2013	10:53	50.3	25.8	6.0
	10/22/2013	10:58	40.0	20.5	9.1
DP-08	7/28/2011	16:06	36.8	18.5	5.0
	10/25/2011	9:33	35.0	19.2	9.8
	2/2/2012	11:54	12.7	8.5	16.1
	4/20/2012	10:56	20.1	9.7	15.5
	7/12/2012	9:09	25.0	12.2	12.5
	10/18/2012	13:16	7.0	4.0	18.0
	1/28/2013	10:55	22.2	12.4	13.2
	10/22/2013	10:41	0.58	15.5	12.3

Table 3-8
Landfill Dual Phase Gas Probes and Gas Vent Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
DP-09	7/28/2011	16:02	62.7	31.0	0.0
	10/25/2011	9:37	51.9	24.6	6.1
	2/2/2012	12:04	16.8	6.3	17.2
	4/20/2012	10:55	43.2	21.6	10.5
	7/12/2012	9:07	52.5	23.3	4.9
	10/18/2012	13:14	35.1	18.7	9.6
	1/28/2013	10:58	48.4	24.5	5.2
	10/22/2013	10:39	47.0	25.0	5.5
DP-10	7/28/2011	16:42	27.3	12.4	6.5
	10/25/2011	10:03	30.4	14.7	11.9
	2/2/2012	11:37	21.4	11.8	15.4
	4/20/2012	10:49	19.8	9.2	17.2
	7/12/2012	8:45	24.9	10.2	13.5
	10/18/2012	12:57	27.3	14.0	12.2
	1/28/2013	10:59	25.9	12.4	12.6
	10/22/2013	11:24	25.0	13.8	13.3
DP-11	7/28/2011	16:47	54.6	27.2	1.3
	10/25/2011	9:58	61.8	28.9	4.2
	2/2/2012	11:28	43.4	23.3	8.1
	4/20/2012	09:52	44.5	21.8	10.0
	7/12/2012	8:49	52.3	22.6	5.1
	10/18/2012	13:01	52.6	24.9	5.7
	1/28/2013	10:43	53.1	25.1	5.4
	10/22/2013	11:36	50.5	28.0	5.1
DP-12	7/28/2011	16:00	56.1	30.5	0.0
	10/25/2011	9:38	58.6	30.3	3.6
	2/2/2012	12:06	18.5	12.0	13.9
	4/20/2012	09:02	20.3	3.4	16.4
	7/12/2012	9:05	57.2	27.9	3.1
	10/18/2012	13:12	44.4	25.8	7.7
	1/28/2013	10:45	60.2	31.9	2.2
	10/22/2013	12:10	48.9	29.5	4.7

Table 3-8
Landfill Dual Phase Gas Probes and Gas Vent Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Monitoring Points	Date	Time (Clock)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
DP-13	7/28/2011	15:57	38.5	19.9	4.1
	10/25/2011	9:40	41.8	21.8	8.7
	2/2/2012	12:08	8.7	4.9	17.5
	4/20/2012	09:04	10.5	2.8	19.5
	7/12/2012	9:03	37.2	17.1	9.1
	10/18/2012	13:10	24.0	11.5	13.7
	1/28/2013	11:00	33.1	16.4	10.7
	10/22/2013	11:37	36.1	17.9	10.5
DP-14	7/28/2011	15:48	62.8	30.6	0.0
	10/25/2011	9:43	64.4	29.0	4.1
	2/2/2012	12:10	24.2	11.2	13.3
	4/20/2012	09:06	16.9	17.7	16.5
	7/12/2012	9:01	61.9	27.1	4.1
	10/18/2012	13:08	44.1	24.3	8.1
	1/28/2013	11:04	65.1	32.0	2.4
	10/22/2013	12:08	63.2	31.5	3.2
DP-15	7/28/2011	16:50	34.2	17.3	5.2
	10/25/2011	9:56	29.3	17.2	11.5
	2/2/2012	11:26	11.3	6.0	16.4
	4/20/2012	09:50	8.3	1.7	20.0
	7/12/2012	8:51	25.1	11.0	12.8
	10/18/2012	13:03	19.4	10.4	15.2
	1/28/2013	11:07	22.5	9.1	14.2
	10/22/2013	11:40	22.7	14.6	13.0
DP-16	7/28/2011	16:52	14.0	9.3	11.0
	10/25/2011	10:26	7.4	5.4	17.7
	2/2/2012	11:17	7.3	6.3	16.3
	4/20/2012	09:40	3.2	2.2	20.2
	7/12/2012	8:27	7.4	4.8	16.7
	10/18/2012	12:18	0.7	0.7	20.3
	1/28/2013	10:07	2.6	3.1	18.9
	10/22/2013	11:46	2.1	2.6	20.2

Table 3-8

Landfill Dual Phase Gas Probes and Gas Vent Monitoring Data

MIG/DeWane Landfill Superfund Site

Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
DP-17	7/28/2011	13:54	59.5	30.4	0.0
	10/25/2011	10:22	60.1	29.4	4.3
	2/2/2012	11:13	44.5	27.3	5.5
	4/20/2012	09:51	1.0	1.9	20.0
	7/12/2012	8:31	38.5	19.0	9.0
	10/18/2012	12:23	44.4	25.4	5.8
	1/28/2013	10:09	50.9	27.8	4.6
	10/22/2013	11:33	50.4	28.4	4.3
GV-01	7/28/2011	16:33	4.0	2.4	17.9
	10/25/2011	10:48	1.7	1.3	20.5
	2/2/2012	10:48	0.7	0.7	20.8
	4/20/2012	10:40	0.2	0.3	21.1
	7/12/2012	8:06	0.4	0.9	19.6
	10/18/2012	12:45	7.3	5.2	17.9
	1/28/2013	10:25	0.1	0.1	20.5
	10/22/2013	11:08	0.4	0.5	21.4
GV-02	7/28/2011	16:30	53.6	30.2	0.6
	10/25/2011	10:50	44.0	23.6	7.8
	2/2/2012	10:46	57.5	33.3	3.8
	4/20/2012	11:07	41.1	23.5	10.3
	7/12/2012	8:05	42.8	22.1	6.9
	10/18/2012	12:48	19.8	11.3	15.1
	1/28/2013	10:27	42.1	24.3	8.0
	10/22/2013	11:06	28.0	17.2	12.1
GV-03	7/28/2011	16:29	24.1	17.0	10.2
	10/25/2011	10:52	24.3	16.0	12.8
	2/2/2012	10:44	12.3	2.7	19.9
	4/20/2012	11:09	0.1	0.1	21.5
	7/12/2012	8:03	8.1	6.7	16.0
	10/18/2012	13:21	2.3	3.0	17.8
	1/28/2013	10:34	9.3	5.2	17.7
	10/22/2013	10:53	11.1	15.2	10.2

Table 3-8

Landfill Dual Phase Gas Probes and Gas Vent Monitoring Data

MIG/DeWane Landfill Superfund Site

Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GV-04	7/28/2011	16:24	59.4	36.7	0.0
	10/25/2011	10:58	60.8	34.5	2.3
	2/2/2012	10:42	27.8	17.1	11.0
	4/20/2012	11:02	57.8	37.9	2.6
	7/12/2012	8:01	55.6	30.7	4.9
	10/18/2012	13:22	53.1	35.2	7.3
	1/28/2013	10:37	61.4	37.0	1.0
	10/22/2013	10:51	49.4	33.8	4.9
GV-05	7/28/2011	16:20	59.1	37.9	0.0
	10/25/2011	9:13	60.5	35.7	2.3
	2/2/2012	10:40	35.8	25.2	6.9
	4/20/2012	08:50	56.6	39.2	2.0
	7/12/2012	7:57	55.4	32.6	4.3
	10/18/2012	8:01	48.6	34.5	3.7
	1/28/2013	10:39	60.3	39.3	0.1
	10/22/2013	10:20	59.4	40.0	0.5
GV-06	7/28/2011	15:08	25.5	25.0	0.0
	10/25/2011	9:09	24.0	21.8	6.8
	2/2/2012	10:32	7.1	4.3	18.8
	4/20/2012	08:47	0.1	0.1	21.7
	7/12/2012	7:55	8.7	7.4	14.6
	10/18/2012	7:55	4.6	14.3	7.7
	1/28/2013	11:10	6.2	12.1	8.7
	10/22/2013	10:16	0.5	0.9	20.8
GV-07	7/28/2011	15:12	55.9	35.1	0.0
	10/25/2011	9:04	59.3	34.0	2.9
	2/2/2012	10:28	52.8	32.6	5.7
	4/20/2012	08:42	62.0	35.7	1.3
	7/12/2012	7:51	50.8	29.4	3.3
	10/18/2012	7:52	53.4	37.7	1.4
	1/28/2013	11:13	62.4	36.7	0.2
	10/22/2013	10:11	58.2	38.7	1.0

Table 3-8
Landfill Dual Phase Gas Probes and Gas Vent Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GV-08	7/28/2011	15:14	55.1	33.2	0.0
	10/25/2011	9:01	54.4	31.7	4.0
	2/2/2012	10:23	48.0	31.4	6.3
	4/20/2012	08:37	51.6	30.5	6.0
	7/12/2012	7:45	41.1	23.2	6.6
	10/18/2012	7:48	28.4	19.3	10.8
	1/28/2013	11:17	35.8	22.3	8.7
	10/22/2013	10:30	19.4	13.3	14.8
GV-09	7/28/2011	16:12	3.8	2.6	17.0
	10/25/2011	9:10	6.7	4.3	16.4
	2/2/2012	12:36	8.1	4.6	18.4
	4/20/2012	08:54	7.4	3.3	19.1
	7/12/2012	9:19	3.2	2.6	18.6
	10/18/2012	13:36	0.4	0.3	21.2
	1/28/2013	11:20	14.3	6.7	16.4
	10/22/2013	10:23	5.0	4.5	18.0
GV-10	7/28/2011	16:58	27.6	13.2	6.5
	10/25/2011	9:21	26.9	14.5	12.6
	2/2/2012	12:34	17.6	9.4	15.2
	4/20/2012	08:57	20.3	9.7	17.5
	7/12/2012	9:23	20.7	9.5	13.1
	10/18/2012	13:34	1.1	0.6	20.8
	1/28/2013	11:25	9.9	5.1	17.7
	10/22/2013	10:28	16.9	10.9	14.2
GV-11	7/28/2011	16:04	62.5	32.6	0.0
	10/25/2011	9:24	62.3	31.2	3.2
	2/2/2012	11:58	32.5	22.7	10.2
	4/20/2012	08:59	59.0	29.4	5.7
	7/12/2012	9:25	50.5	24.9	4.1
	10/18/2012	13:26	45.9	25.7	6.7
	1/28/2013	11:30	60.9	28.6	3.4
	10/22/2013	10:37	59.0	31.5	2.6

Table 3-8
Landfill Dual Phase Gas Probes and Gas Vent Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GV-12	7/28/2011	15:26	60.8	30.5	0.0
	10/25/2011	8:55	65.4	32.3	2.2
	2/2/2012	12:30	31.6	16.1	10.5
	4/20/2012	08:30	63.9	35.1	0.4
	7/12/2012	9:27	65.7	30.9	1.9
	10/18/2012	7:42	50.5	28.8	4.6
	1/28/2013	11:33	44.1	25.1	6.5
	10/22/2013	10:36	64.0	35.7	0.1
GV-13	7/28/2011	15:56	29.1	20.6	6.0
	10/25/2011	8:53	7.7	4.9	18.5
	2/2/2012	12:27	7.2	4.7	18.6
	4/20/2012	08:20	9.5	6.2	19.0
	7/12/2012	9:29	3.6	2.3	19.2
	10/18/2012	13:31	3.3	2.6	18.2
	1/28/2013	11:35	34.4	20.8	9.2
	10/22/2013	12:13	4.9	3.6	19.9
GV-14	7/28/2011	15:38	52.9	23.3	0.0
	10/25/2011	8:51	65.5	32.1	2.2
	2/2/2012	12:23	0.0	0.1	19.8
	4/20/2012	08:16	50.0	35.0	1.0
	7/12/2012	9:31	73.1	25.7	0.8
	10/18/2012	13:29	63.9	35.5	0.3
	1/28/2013	11:39	63.9	34.6	1.0
	10/22/2013	12:06	63.3	36.2	0.3
GV-15	7/28/2011	15:40	24.8	24.7	2.1
	10/25/2011	12:53	17.9	12.7	13.4
	2/2/2012	12:21	2.8	2.1	19.6
	4/20/2012	08:10	1.5	1.2	21.0
	7/12/2012	9:33	0.7	0.1	20.6
	10/18/2012	12:06	3.9	10.5	13.2
	1/28/2013	9:55	5.8	6.4	16.0
	10/22/2013	12:03	26.4	30.5	2.2

Table 3-8

Landfill Dual Phase Gas Probes and Gas Vent Monitoring Data

MIG/DeWane Landfill Superfund Site

Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GV-16	7/28/2011	15:42	66.2	33.7	0.0
	10/25/2011	8:49	64.6	32.6	2.5
	2/2/2012	12:19	27.7	16.9	11.7
	4/20/2012	08:18	50.0	34.1	5.1
	7/12/2012	9:35	<0.1	<0.1	20.6
	10/18/122	12:08	55.4	30.9	3.7
	1/28/2013	9:56	64.5	34.6	0.4
	10/22/2013	12:01	63.4	35.8	0.6
GV-17	7/28/2011	15:43	19.6	12.4	11.4
	10/25/2011	9:50	34.9	21.7	10.1
	2/2/2012	12:17	7.9	4.6	18.1
	4/20/2012	08:12	7.7	4.4	19.3
	7/12/2012	8:55	11.5	7.4	16.1
	10/18/2012	12:12	15.5	20.8	6.2
	1/28/2013	9:58	11.9	7.3	16.2
	10/22/2013	12:00	20.3	22.1	9.1
GV-18	7/28/2011	14:44	24.0	16.2	6.8
	10/25/2011	9:48	37.2	22.9	8.5
	2/2/2012	12:15	1.3	0.9	20.3
	4/20/2012	08:14	15.5	8.8	16.1
	7/12/2012	8:57	4.7	3.4	18.5
	10/18/2012	12:10	4.0	4.1	18.6
	1/28/2013	9:57	7.4	5.1	17.4
	10/22/2013	11:58	5.5	4.7	19.2
GV-19	7/28/2011	16:55	36.1	22.3	1.9
	10/25/2011	10:30	50.8	29.2	2.8
	2/2/2012	11:20	47.2	25.7	5.3
	4/20/2012	09:17	28.0	14.0	15.2
	7/12/2012	8:23	27.9	19.2	5.6
	10/18/2012	12:14	3.9	4.1	18.1
	1/28/2013	9:59	14.0	10.1	13.3
	10/22/2013	11:49	11.6	10.4	15.1

Table 3-8

Landfill Dual Phase Gas Probes and Gas Vent Monitoring Data

MIG/DeWane Landfill Superfund Site

Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GV-20	7/28/2011	16:53	5.7	3.9	16.7
	10/25/2011	10:28	3.6	2.4	20.0
	2/2/2012	11:19	0.5	0.5	20.8
	4/20/2012	09:15	1.9	1.3	21.4
	7/12/2012	8:25	5.8	4.2	17.3
	10/18/2012	12:16	1.6	1.3	20.1
	1/28/2013	10:05	1.8	2.4	19.2
	10/22/2013	11:47	8.6	6.5	17.1
GV-21	7/28/2011	13:52	43.6	21.1	0.2
	10/25/2011	10:24	31.4	18.0	9.6
	2/2/2012	11:15	8.2	5.1	17.8
	4/20/2012	09:53	23.1	12.4	15.0
	7/12/2012	8:29	38.4	20.1	6.1
	10/18/2012	12:21	12.8	9.3	15.9
	1/28/2013	10:07	13.7	8.3	14.4
	10/22/2013	11:44	13.3	8.7	16.4
GV-22	7/28/2011	14:00	21.2	22.9	0.0
	10/25/2011	10:35	25.6	22.6	2.6
	2/2/2012	11:07	0.0	0.0	21.2
	4/20/2012	10:00	4.7	2.2	19.1
	7/12/2012	8:19	16.8	22.0	2.1
	10/18/2012	12:27	5.1	17.2	5.5
	1/28/2013	10:13	8.2	18.2	1.9
	10/22/2013	11:29	0.1	0.4	21.5
GV-23	7/28/2011	14:03	32.6	17.9	4.2
	10/25/2011	10:37	47.2	27.3	5.6
	2/2/2012	11:05	0.8	0.8	20.6
	4/20/2012	10:02	0.8	0.5	21.4
	7/12/2012	8:17	25.7	14.6	10.9
	10/18/2012	12:30	30.2	23.2	8.7
	1/28/2013	10:14	20.4	14.3	11.8
	10/22/2013	11:21	35.5	23.2	8.6

Table 3-8

Landfill Dual Phase Gas Probes and Gas Vent Monitoring Data

MIG/DeWane Landfill Superfund Site

Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GV-24	7/28/2011	14:14	36.4	25.1	0.0
	10/25/2011	10:41	47.9	30.5	3.5
	2/2/2012	10:58	9.7	7.8	17.4
	4/20/2012	10:15	36.8	25.0	9.6
	7/12/2012	8:14	30.5	19.0	7.6
	10/18/2012	12:36	36.8	31.6	2.5
	1/28/2013	10:20	17.5	14.1	10.4
	10/22/2013	11:18	41.5	29.5	3.2
GV-25	7/28/2011	14:18	33.3	2.8	18.2
	10/25/2011	10:44	42.6	30.0	4.6
	2/12/2012	10:54	24.7	18.3	9.7
	4/20/2012	10:18	12.0	8.9	18.2
	7/12/2012	8:10	42.7	30.2	2.1
	10/18/2012	12:39	20.5	22.1	6.9
	1/28/2013	10:23	33.4	29.6	1.7
	10/22/2013	11:10	10.0	33.7	1.8
GV-26	7/28/2011	14:20	5.5	4.0	17.9
	10/25/2011	10:46	54.3	35.9	2.6
	2/2/2012	10:52	35.4	25.9	6.9
	4/20/2012	10:19	32.5	22.7	8.9
	7/12/2012	8:00	47.9	31.4	5.4
	10/18/2012	12:41	22.8	20.1	10.3
	1/28/2013	10:24	27.2	23.1	7.4
	10/22/2013	11:09	22.2	18.5	12.6
GV-27	7/28/2011	15:24	12.6	7.0	15.1
	10/25/2011	8:57	16.6	10.4	15.5
	2/2/2012	12:50	0.0	0.1	20.9
	4/20/2012	08:32	0.2	0.1	21.7
	7/12/2012	7:40	9.2	5.2	17.2
	10/18/2012	7:43	1.0	0.7	21.1
	1/28/2013	11:45	7.0	4.1	18.9
	10/22/2013	10:33	9.2	7.5	17.3

Table 3-8
Landfill Dual Phase Gas Probes and Gas Vent Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GV-28	7/28/2011	16:18	59.1	36.9	0.0
	10/25/2011	9:11	60.4	34.5	2.4
	2/2/2012	10:33	53.3	35.6	3.5
	4/20/2012	08:48	55.5	34.7	3.0
	7/12/2012	7:56	49.9	29.1	3.2
	10/18/2012	7:57	27.9	18.8	11.8
	1/28/2013	11:50	50.1	32.1	3.8
	10/22/2013	10:18	59.5	38.6	0.9
GV-29	7/28/2011	14:06	37.7	23.0	2.2
	10/25/2011	10:39	46.1	29.0	4.0
	2/2/2012	11:03	0.5	0.5	20.8
	4/20/2012	10:06	23.8	13.1	12.8
	7/12/2012	8:16	22.4	14.9	8.9
	10/18/2012	12:32	31.3	27.4	4.2
	1/28/2013	10:15	25.0	19.6	7.5
	10/22/2013	11:17	39.0	32.4	2.7
GV-30	7/28/2011	16:11	53.5	36.5	0.0
	10/25/2011	9:28	52.6	35.2	3.2
	2/2/2012	12:43	4.5	2.6	19.2
	4/20/2012	11:00	43.0	25.0	6.6
	7/12/2012	9:18	35.4	22.2	7.3
	10/18/2012	13:23	12.4	8.8	13.7
	1/28/2013	11:53	48.1	31.6	3.9
	10/22/2013	10:48	49.0	35.5	3.5
GV-31	7/28/2011	15:46	13.1	7.5	14.6
	10/25/2011	9:46	12.6	7.9	16.8
	2/2/2012	12:13	7.7	4.8	18.4
	4/20/2012	09:08	10.0	5.3	19.2
	7/12/2012	88:59	3.9	2.6	18.7
	10/18/2012	13:07	2.2	2.5	20.0
	1/28/2013	11:59	4.7	3.6	18.5
	10/22/2013	11:57	5.4	4.6	18.2

Table 3-8
Landfill Dual Phase Gas Probes and Gas Vent Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GV-32	7/28/2011	16:57	0.2	0.0	19.2
	10/25/2011	9:54	0.1	3.2	18.4
	2/2/2012	11:22	3.2	2.6	19.0
	4/20/2012	09:12	0.1	0.3	21.5
	7/12/2012	8:53	0.2	1.5	18.6
	10/18/2012	13:05	0.0	0.5	20.6
	1/28/2013	12:01	8.7	5.3	17.3
	10/22/2013	11:52	0.0	0.2	21.5
GV-33	7/28/2011	16:38	33.3	17.4	5.3
	10/25/2011	10:14	41.7	26.3	6.7
	2/2/2012	11:43	18.4	15.1	13.6
	4/20/2012	10:10	4.3	2.3	21.0
	7/12/2012	8:37	25.8	13.1	11.3
	10/18/2012	12:34	3.2	2.2	19.8
	1/28/2013	10:16	12.9	6.8	16.2
	10/22/2013	11:15	19.7	13.5	14.5
GV-34	7/28/2011	16:09	33.6	18.7	6.1
	10/25/2011	9:35	33.7	21.4	9.5
	2/2/2012	11:52	10.1	4.2	17.1
	4/20/2012	10:58	2.6	1.1	21.0
	7/12/2012	9:11	27.9	15.5	11.1
	10/18/2012	13:18	2.3	1.7	20.0
	1/28/2013	11:55	30.1	17.2	10.8
	10/22/2013	10:46	16.6	11.8	14.5
GV-35	7/28/2011	16:35	43.4	20.0	2.8
	10/25/2011	10:18	49.9	24.8	5.8
	2/2/2012	11:34	11.5	6.3	16.6
	4/20/2012	10:05	10.1	3.3	19.6
	7/12/2012	8:38	55.0	22.9	6.5
	10/18/2012	12:29	21.5	12.1	13.7
	1/28/2013	10:12	10.9	5.6	16.6
	10/22/2013	11:22	10.1	5.6	18.4

Table 3-8
Landfill Dual Phase Gas Probes and Gas Vent Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GV-36	7/28/2011	15:57	44.8	27.2	0.0
	10/25/2011	10:20	10.3	6.3	17.7
	2/2/2012	11:11	2.1	1.9	20.0
	4/20/2012	09:57	5.4	3.1	20.3
	7/12/2012	8:32	28.8	16.1	9.4
	10/18/2012	12:25	9.2	6.1	17.3
	1/28/2013	10:10	6.2	4.8	17.3
	10/22/2013	11:28	8.4	5.6	18.6
GV-37	7/28/2011	17:02	0.3	0.0	19.8
	10/25/2011	9:19	0.5	0.8	20.6
	2/2/2012	12:36	0.0	0.0	20.8
	4/20/2012	08:57	0.6	0.5	21.4
	7/12/2012	9:21	0.4	0.1	20.5
	10/18/2012	13:35	0.2	0.2	21.2
	1/28/2013	12:10	0.3	0.2	20.8
	10/22/2013	10:25	0.1	0.4	21.2
GV-38	7/28/2011	14:16	48.2	32.9	0.0
	10/25/2011	10:43	52.0	34.5	3.0
	2/2/2012	10:56	40.5	30.9	5.8
	4/20/2012	10:17	28.1	10.6	14.3
	7/12/2012	8:12	39.2	26.7	3.8
	10/18/2012	12:38	18.7	15.9	12.2
	1/28/2013	10:22	33.7	27.4	5.3
	10/22/2013	11:12	36.5	30.5	5.0
GV-39	7/28/2011	15:10	28.3	16.7	5.7
	10/25/2011	9:05	23.4	14.0	13.3
	2/2/2012	10:29	2.5	1.3	20.6
	4/20/2012	08:45	28.0	15.6	14.0
	7/12/2012	7:54	10.9	6.3	16.4
	10/18/2012	7:53	8.0	5.9	18.1
	1/28/2013	12:15	11.8	6.9	16.3
	10/22/2013	10:14	11.0	7.2	17.5

Table 3-8
Landfill Dual Phase Gas Probes and Gas Vent Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GV-40	7/28/2011	15:13	45.4	0.8	1.1
	10/25/2011	9:03	15.4	10.2	15.6
	2/2/2012	10:26	10.3	4.5	17.9
	4/20/2012	08:40	6.6	4.5	19.9
	7/12/2012	7:48	13.6	9.1	15.4
	10/18/2012	7:50	4.6	3.3	19.9
	1/28/2013	12:19	7.3	4.7	18.6
	10/22/2013	10:09	2.0	1.7	20.7
GV-41	7/28/2011	15:15	19.3	14.7	6.9
	10/25/2011	8:59	13.7	8.8	16.1
	2/2/2012	10:20	11.4	6.8	17.0
	4/20/2012	08:35	12.1	6.7	19.0
	7/12/2012	7:42	7.1	6.5	15.5
	10/18/2012	7:45	1.5	1.3	20.8
	1/28/2013	12:23	1.8	1.8	19.9
	10/22/2013	10:31	2.5	2.3	20.3

Checked by: SJM

Table 3-9A
Historical Gas Probe Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Barometric Pressure (inches Hg)	Vacuum inches H_2O	LEL (%)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GP26	1/18/2007	10:40	30.1	0.00	<0.1	<0.1	0.7	22.3
	4/27/2007	15:40	29.7	-1.00	94	4.7	2.1	17.8
	7/26/2007	14:33	29.9	-0.05	--	38.8	51.7	2.2
	10/23/2007	14:19	30.0	0.00	--	27.0	16.6	7.4
	3/5/2008	10:34	29.5	0.01	4	0.2	NM	NM
	5/8/2008	11:50	29.1	-0.11	<0.1	<0.1	<0.1	20.2
	7/30/2008	N/A	29.7	N/A	N/A	N/A	N/A	N/A
	10/16/2008	9:48	30.3	-0.01	<0.1	<0.1	<0.1	20.8
	1/29/2009	11:10	30.0	0.00	4	0.2	0.2	18.9
	4/29/2009	13:41	30.3	0.00	<0.1	<0.1	<0.1	21.1
	7/29/2009	N/A	29.8	N/A	N/A	N/A	N/A	N/A
	10/14/2009	N/A	30.2	N/A	N/A	N/A	N/A	N/A
	1/26/2010	12:20	29.9	N/A	N/A	N/A	N/A	N/A
	5/28/2010	8:01	29.9	0.00	<0.1	<0.1	<0.1	20.5
	7/21/2010	9:35	30.0	0.00	<0.1	<0.1	<0.1	20.2
	10/27/2010	8:25	29.4	0.00	--	36.5	26.2	2.4
	2/15/2011	9:15	30.2	0.00	<0.1	<0.1	0.2	21.0
	5/2/2011	10:22	30.2	0.00	<0.1	<0.1	<0.1	22.0
	7/28/2011	14:10	29.9	0.50	<0.1	<0.1	<0.1	20.5
	10/25/2011	N/A	30.0	N/A	N/A	N/A	N/A	N/A
	2/2/2012	9:23	29.4	0.00	<0.1	<0.1	<0.1	21.7
	4/20/2012	10:12	29.8	.5	2	0.1	0.2	21.5
	7/12/2012		30.1	-0.03	--	24.1	18.6	7.7
	10/18/2012	14:10	28.6	0	--	7.3	13.2	9.5
	1/28/2013	8:05	29.9	0.00	<0.1	<0.1	<0.1	20.9
	4/16/2013	7:52	30.2	-2.00	<0.1	<0.1	<0.1	21.4
	7/22/2013	N/A	29.8	N/A	N/A	N/A	N/A	N/A
	10/22/2013	8:54	30.0	0	--	32.7	26.9	2.2
	3/13/2014	9:51	30.0	0	<0.1	<0.1	0.1	22.5

Table 3-9A
Historical Gas Probe Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Barometric Pressure (inches Hg)	Vacuum inches H_2O	LEL (%)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GP27	1/18/2007	10:30	30.1	0.00	--	69.4	23.8	1.2
	4/27/2007	15:50	29.7	-1.30	--	74.3	24.1	<0.1
	7/26/2007	15:37	29.9	0.03	44	2.2	2.0	17.8
	10/23/2007	14:12	30.0	0.01	8	0.4	1.3	17.7
	3/5/2008	10:28	29.5	0.01	--	53.7	NM	NM
	5/8/2008	11:41	29.1	-0.10	--	80.1	22.5	0.8
	7/30/2008	11:10	29.7	0.00	6	0.3	<0.1	20.5
	10/16/2008	9:41	30.3	0.01	--	32.4	17.0	3.0
	1/29/2009	13:09	30.0	0.00	--	12.5	8.5	11.6
	4/29/2009	11:39	30.3	0.00	<0.1	<0.1	<0.1	21.1
	7/29/2009	9:11	29.8	0.00	28	1.4	0.9	18.8
	10/14/2009	9:30	30.2	-0.01	<0.1	<0.1	<0.1	20.7
	1/26/2010	12:15	29.9	0.00	<0.1	<0.1	0.5	20.7
	5/28/2010	7:48	29.9	0.00	<0.1	<0.1	<0.1	20.5
	7/21/2010	9:26	30.0	0.00	4	0.2	<0.1	20.2
	10/27/2010 (1)	8:13	29.4	0.00	<0.1	<0.1	<0.1	22.0
	2/15/2011	9:06	30.2	0.00	<0.1	<0.1	0.2	21.0
	5/2/2011	10:15	30.2	0.00	<0.1	<0.1	<0.1	21.8
	7/28/2011	13:41	29.9	0.00	<0.1	<0.1	<0.1	20.4
	10/25/2011	12:09	30.0	-0.07	--	10.7	9.0	11.0
	2/2/2012	9:12	29.4	0.00	<0.1	<0.1	<0.1	21.7
	4/20/2012	9:35	29.8	0.00	2	0.1	0.1	21.4
	7/12/2012		30.1	0.00	6	0.3	0.0	20.4
	10/18/2012 (1)	14:01	28.3	-0.03	6	0.3	<0.1	20.7
	1/28/2013	8:12	29.9	0.00	<0.1	<0.1	<0.1	20.9
	4/16/2013	7:45	30.2	0.00	<0.1	<0.1	<0.1	21.4
	7/22/2013	9:33	29.8	0.02	<0.1	<0.1	<0.1	19.1
	10/22/2013	8:13	30.0	0	<0.1	<0.1	0.1	2.9
	3/13/2014	9:31	30.0	0	2	0.1	0.1	22.5

Table 3-9A
Historical Gas Probe Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Barometric Pressure (inches Hg)	Vacuum inches H_2O	LEL (%)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GP28	1/18/2007	9:30	30.1	0.15	--	67.5	26.7	<0.1
	4/27/2007	16:00	29.7	0.60	--	71.8	25.0	<0.1
	7/26/2007	14:57	29.9	0.40	--	64.0	57.4	0.4
	10/23/2007	14:06	30.0	0.03	--	64.4	30.7	0.2
	3/5/2008	10:20	29.5	-0.11	--	81.1	NM	NM
	5/8/2008	11:35	29.1	0.20	--	72.2	32.9	0.9
	7/30/2008	10:40	29.7	0.10	--	71.2	28.1	0.3
	10/16/2008	9:34	30.3	0.02	--	73.3	26.2	0.3
	1/29/2009	13:02	30.0	0.50	--	72.0	27.7	0.3
	4/29/2009	11:32	30.3	0.20	--	74.0	26.0	0.0
	7/29/2009	10:21	29.8	0.05	--	72.9	26.9	0.1
	10/14/2009	9:25	30.2	0.04	--	75.6	23.5	0.6
	1/26/2010	12:07	29.9	0.03	--	79.4	18.4	0.8
	5/28/2010	7:41	29.9	0.80	--	75.1	24.5	0.2
	7/21/2010	9:20	30.0	0.03	--	75.1	24.3	0.5
	10/27/2010	8:04	29.4	-0.04	--	70.3	29.6	0.0
	2/15/2011	8:50	30.2	0.04	--	71.6	26.4	1.6
	5/2/2011	10:03	30.2	0.08	--	72.8	28.7	0.4
	7/28/2011	13:27	29.9	0.10	--	63.1	29.2	0.0
	10/25/2011	11:52	30.0	0.16	--	70.6	27.6	1.6
	2/2/2012	9:00	29.4	0.02	--	69.8	26.1	0.3
	4/20/2012	9:19	29.8	0.05	2	0.1	0.1	21.6
	7/12/2012		30.1	0.04	--	65.4	30.1	2.1
	10/18/2012	13:51	28.3	0.00	--	57.8	30.6	2.2
	1/28/2013	8:17	29.9	0.00	--	47.6	17.0	0.7
	4/16/2013	7:30	30.2	-0.20	--	30.4	10.7	12.0
	7/22/2013	9:20	29.8	0.10	--	94.7	5.2	0.0
	10/22/2013	7:45	30.0	0.05	--	68.4	30.6	0.8
	3/13/2014	9:20	30.0	0	--	73.5	26.4	0

Table 3-9A
Historical Gas Probe Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Barometric Pressure (inches Hg)	Vacuum inches H_2O	LEL (%)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GP29	1/18/2007	9:35	30.1	0.00	<0.1	<0.1	0.4	21.4
	4/27/2007	16:15	29.7	0.03	6	0.3	0.5	19.7
	7/26/2007	14:51	29.9	0.00	<0.1	<0.1	0.6	19.7
	10/23/2007	15:00	30.0	0.02	<0.1	<0.1	<0.1	19.6
	3/5/2008	10:12	29.5	0.01	<0.1	<0.1	NM	NM
	5/8/2008	11:23	29.1	-0.25	<0.1	<0.1	<0.1	20.7
	7/30/2008	10:30	29.7	0.00	<0.1	<0.1	<0.1	20.7
	10/16/2008	11:05	30.3	0.00	<0.1	<0.1	<0.1	20.7
	1/29/2009	15:38	30.0	0.00	4	0.2	0.2	20.2
	4/29/2009	11:20	30.3	0.00	<0.1	<0.1	<0.1	20.8
	7/29/2009	10:15	29.8	0.00	4	0.2	12.1	11.3
	10/14/2009	9:15	30.2	0.00	<0.1	<0.1	0.2	20.7
	1/26/2010	12:01	29.9	0.00	<0.1	<0.1	0.2	20.1
	5/28/2010	7:31	29.9	0.00	<0.1	<0.1	<0.1	20.6
	7/21/2010	9:14	30.0	0.00	<0.1	<0.1	<0.1	20.5
	10/27/2010	7:57	29.4	0.00	<0.1	<0.1	0.3	21.9
	2/15/2011	8:40	30.2	0.00	<0.1	<0.1	0.2	20.8
	5/2/2011	9:57	30.2	0.00	<0.1	<0.1	<0.1	21.7
	7/28/2011	13:20	29.9	0.00	<0.1	<0.1	<0.1	20.8
	10/25/2011	11:50	30.0	0.00	2	0.1	0.1	20.8
	2/2/2012	8:50	29.4	0.00	<0.1	<0.1	<0.1	21.2
	4/20/2012	8:06	29.8	0.00	2	0.1	0.1	21.4
	7/12/2012		30.1	0.00	6	0.3	1.5	19.0
	10/18/2012	13:46	28.3	0.00	4	0.2	0.6	20.9
	1/28/2013	8:00	29.9	0.00	<0.1	<0.1	0.4	19.8
	4/16/2013	7:19	30.2	0.00	<0.1	<0.1	<0.1	21.2
	7/22/2013	9:17	29.8	0.00	2	0.1	0.1	19.7
	10/22/2013	7:37	30.0	0	<0.1	<0.1	0.2	21.8
	3/13/2014	9:10	30.0	0	<0.1	<0.1	0.1	22.8

Table 3-9A
Historical Gas Probe Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Barometric Pressure (inches Hg)	Vacuum inches H_2O	LEL (%)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GP30	1/18/2007	9:40	30.1	0.02	--	52.3	22.5	4.8
	4/27/2007	14:45	29.7	0.03	--	29.0	19.1	9.7
	7/26/2007	13:36	29.9	0.00	<0.1	<0.1	7.6	17.3
	10/23/2007	13:10	30.0	0.00	<0.1	<0.1	5.2	16.4
	3/5/2008	11:19	29.5	0.00	--	66.0	NM	NM
	5/8/2008	12:39	29.1	0.01	--	48.6	37.0	3.8
	7/30/2008	12:20	29.7	0.00	--	10.2	3.2	19.2
	10/16/2008	10:51	30.3	0.00	--	11.0	12.0	12.5
	1/29/2009	15:46	30.0	0.00	28	1.4	0.8	20.1
	4/29/2009	13:20	30.3	0.00	22	1.1	0.6	21.1
	7/29/2009	10:08	29.8	0.00	4	0.2	15.2	7.0
	10/14/2009	10:45	30.2	0.00	88	4.4	3.3	18.9
	1/26/2010	13:10	29.9	0.00	--	30.9	15.2	15.5
	5/28/2010	8:45	29.9	0.00	6	0.3	0.2	20.4
	7/21/2010	10:25	30.0	0.00	16	0.8	4.5	16.5
	10/27/2010	9:10	29.4	0.00	<0.1	<0.1	0.3	20.9
	2/15/2010	10:05	30.2	0.00	24	1.2	0.7	20.7
	5/2/2011	12:46	30.2	0.00	18	0.9	0.4	21.5
	7/28/2011	15:04	29.9	0.00	<0.1	<0.1	<0.1	20.3
	10/25/2011	13:13	30.0	0.00	--	24.2	18.0	7.1
	2/2/2012	10:17	29.4	0.00	18	0.9	0.7	20.9
	4/20/2012	11:50	29.8	0.00	48	2.4	1.5	20.6
	7/12/2012		30.1	0.00	<0.1	<0.1	9.1	14.5
	10/18/2012	14:46	28.3	0.00	<0.1	<0.1	2.6	20.3
	1/28/2013	8:59	29.9	0.00	--	23.6	6.1	3.9
	4/16/2013	9:00	30.2	0.00	--	34.4	12.5	8.3
	7/22/2013	10:38	29.8	0.00	4	0.2	13.5	7.3
	10/22/2013	10:05	30.0	0.03	<0.1	<0.1	3.8	19.7
	3/13/2014	13:06	30.0	0	28	1.4	0.6	21.4

Table 3-9A
Historical Gas Probe Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Barometric Pressure (inches Hg)	Vacuum inches H_2O	LEL (%)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GP31	1/18/2007	9:45	30.1	-0.51	<0.1	<0.1	0.4	22.0
	4/27/2007	14:55	29.7	3.00	4	0.2	0.4	20.3
	7/26/2007	13:40	29.9	-0.17	<0.1	<0.1	<0.1	20.1
	10/23/2007	13:15	30.0	-0.34	<0.1	<0.1	<0.1	20.0
	3/5/2008	11:12	29.5	-0.01	<0.1	<0.1	NM	NM
	5/8/2008	12:28	29.1	-1.5	<0.1	<0.1	<0.1	20.2
	7/30/2008	12:10	29.7	-0.75	<0.1	<0.1	<0.1	20.3
	10/16/2008	10:42	30.3	-0.07	<0.1	<0.1	<0.1	20.7
	1/29/2009	15:58	30.0	-0.15	<0.1	<0.1	0.2	20.7
	4/29/2009	14:15	30.3	-1.00	<0.1	<0.1	<0.1	21.2
	7/29/2009	10:01	29.8	0.10	4	0.20	<0.1	20.4
	10/14/2009	10:38	30.2	-0.35	<0.1	<0.1	<0.1	20.7
	1/26/2010	13:04	29.9	-0.35	16	0.80	1.4	20.0
	5/28/2010	8:50	29.9	0.00	<0.1	<0.1	<0.1	20.6
	7/21/2010	10:19	30.0	-0.35	4	0.20	<0.1	20.0
	10/27/2010	9:04	29.4	-0.06	<0.1	<0.1	<0.1	21.4
	2/15/2011	9:53	30.2	-0.50	<0.1	<0.1	0.2	21.0
	5/2/2011	10:57	3.2	-0.05	<0.1	<0.1	<0.1	22.0
	7/28/2011	14:51	29.9	-0.05	<0.1	<0.1	<0.1	20.4
	10/25/2011	14:10	30.0	-0.15	<0.1	<0.1	<0.1	20.6
	2/2/2012	10:05	29.4	-0.04	<0.1	<0.1	<0.1	21.4
	4/20/2012	11:37	29.8	0.50	2	0.10	0.10	21.3
	7/12/2012		30.1	0.00	<0.1	<0.1	<0.1	20.2
	10/18/2012	14:37	28.3	0.00	32	1.6	0.90	20.7
	1/28/2013	8:50	29.9	-0.10	<0.1	<0.1	<0.1	21.0
	4/16/2013	8:28	30.2	0.00	<0.1	<0.1	0.60	20.8
	7/22/2013	10:22	29.8	-0.05	6	0.30	0.00	18.9
	10/22/2013	9:52	30.0	0	<0.1	<0.1	0.1	21.4
	3/13/2014	12:50	30.0	0	64	3.2[2]	3.8	14.8

Table 3-9A
Historical Gas Probe Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Barometric Pressure (inches Hg)	Vacuum inches H_2O	LEL (%)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GP32	1/18/2007	9:48	30.1	0.00	<0.1	<0.1	3.2	20.5
	4/27/2007	15:15	29.7	0.00	6	0.3	2.5	18.7
	7/26/2007	13:43	29.9	0.00	<0.1	<0.1	2.8	18.3
	10/23/2007	13:40	30.0	0.00	<0.1	<0.1	2.9	18.3
	3/5/2008	11:07	29.5	0.00	<0.1	<0.1	NM	NM
	5/8/2008	12:22	29.1	0.00	10	0.5	2.2	18.7
	7/30/2008	11:55	29.7	0.00	<0.1	<0.1	0.4	20.5
	10/16/2008	10:27	30.3	0.00	<0.1	<0.1	3.0	19.0
	1/29/2009	13:54	30.0	0.00	<0.1	<0.1	<0.1	20.7
	4/29/2009	14:09	30.3	0.00	<0.1	<0.1	0.6	20.6
	7/29/2009	9:53	29.8	0.00	<0.1	<0.1	2.1	19.3
	10/14/2009	10:30	30.2	0.00	<0.1	<0.1	0.3	20.4
	1/26/2010	12:56	29.9	0.00	<0.1	<0.1	2.1	20.4
	5/28/2010	9:26	29.9	0.00	<0.1	<0.1	<0.1	20.4
	7/21/2010	10:12	30.0	0.00	<0.1	<0.1	<0.1	20.2
	10/27/2010	8:56	29.4	0.00	<0.1	<0.1	0.1	21.3
	2/15/2011	9:46	30.2	0.00	2	0.1	0.2	21.1
	5/2/2011	10:51	30.2	0.10	<0.1	<0.1	<0.1	22.1
	7/28/2011	14:45	29.9	0.00	<0.1	<0.1	<0.1	20.4
	10/25/2011	12:40	30.0	0.00	<0.1	<0.1	3.0	19.1
	2/2/2012	9:50	29.4	0.00	<0.1	<0.1	<0.1	21.6
	4/20/2012	11:30	29.8	0.00	2	0.1	0.1	21.3
	7/12/2012		30.1	0.00	6	0.3	2.3	18.6
	10/18/2012	14:33	28.3	0.00	<0.1	<0.1	<0.1	21.4
	1/28/2013	8:43	29.9	0.00	<0.1	<0.1	1.0	20.3
	4/16/2013	8:48	30.2	-0.70	<0.1	<0.1	<0.1	21.3
	7/22/2013	10:15	29.8	0.20	4	0.2	1.5	17.5
	10/22/2013	9:43	30.0	0.01	<0.1	<0.1	0.2	21.5
	3/13/2014	10:31	30.0	0	<0.1	<0.1	0.1	22.1

Table 3-9A
Historical Gas Probe Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Barometric Pressure (inches Hg)	Vacuum inches H_2O	LEL (%)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GP33	1/18/2007	9:53	30.1	-0.80	<0.1	<0.1	0.3	22.2
	4/27/2007	15:20	29.7	-2.30	18	0.9	0.5	19.9
	7/26/2007	13:57	29.9	-0.20	<0.1	<0.1	<0.1	19.8
	10/23/2007	13:45	30.0	-0.38	<0.1	<0.1	<0.1	19.9
	3/5/2008	10:56	29.5	-0.03	<0.1	<0.1	NM	NM
	5/8/2008	12:18	29.1	-1.00	<0.1	<0.1	<0.1	20.2
	7/30/2008	11:40	29.7	-0.75	8	0.4	<0.1	20.2
	10/16/2008	10:19	30.3	-0.30	<0.1	<0.1	<0.1	20.6
	1/29/2009	13:47	30.0	-0.65	<0.1	<0.1	<0.1	19.6
	2/27/2009	10:37	30.0		<0.1	<0.1	<0.1	20.3
	4/29/2009	14:02	30.3	-1.20	<0.1	<0.1	<0.1	21.2
	7/29/2009	9:46	29.8	0.42	<0.1	<0.1	<0.1	20.4
	10/14/2009	10:12	30.2	-0.50	<0.1	<0.1	<0.1	20.7
	1/26/2010	12:50	29.9	-1.00	<0.1	<0.1	0.2	21.0
	5/28/2010	9:18	29.9	0.00	<0.1	<0.1	<0.1	20.5
	7/21/2010	10:06	30.0	-0.35	4	0.2	<0.1	20.2
	10/27/2010	8:50	29.4	-0.25	<0.1	<0.1	<0.1	21.6
	2/15/2011	9:40	30.2	-0.60	<0.1	<0.1	0.2	21.0
	5/2/2011	10:45	30.2	-0.40	<0.1	<0.1	<0.1	22.1
	7/28/2011	14:35	29.9	-1.00	<0.1	<0.1	<0.1	20.2
	10/25/2011	12:38	30.0	-0.50	<0.1	<0.1	<0.1	20.8
	2/2/2012	9:48	29.4	-0.80	<0.1	<0.1	0.1	21.6
	4/20/2012	11:19	29.8	-0.70	2	0.1	0.1	21.4
	7/12/2012		30.1	-0.23	<0.1	<0.1	0.1	20.3
	10/18/2012	14:30	28.3	-0.10	<0.1	<0.1	<0.1	21.5
	1/28/2013	8:37	29.9	-0.25	<0.1	<0.1	<0.1	21.1
	4/16/2013	8:18	30.2	-0.60	<0.1	<0.1	<0.1	21.3
	7/22/2013	10:03	29.8	-0.25	4	0.2	<0.1	19.2
	10/22/2013	9:36	30.0	-0.17	<0.1	<0.1	0.1	21.5
	3/13/2014	10:20	30.0	0	6	0.3	0.9	19.8

Table 3-9A
Historical Gas Probe Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Barometric Pressure (inches Hg)	Vacuum inches H_2O	LEL (%)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GP34	2/15/2011	10:13	30.2	0.00	<0.1	<0.1	0.2	21.0
	5/2/2011	11:05	30.2	0.00	2	0.1	<0.1	22.0
	7/28/2011	14:58	29.9	0.00	<0.1	<0.1	<0.1	20.3
	10/25/2011	13:17	30.0	-0.10	<0.1	<0.1	<0.1	20.4
	2/12/2012	10:12	29.4	0.00	<0.1	<0.1	<0.1	21.5
	4/20/2012	11:10	29.8	0.10	2	0.1	0.3	21.2
	7/12/2012		30.1	0.00	<0.1	<0.1	0.9	19.4
	10/18/2012	14:42	28.3	0.00	<0.1	<0.1	0.2	21.2
	1/28/2013	8:55	29.9	0.00	<0.1	<0.1	<0.1	20.9
	4/16/2013	8:44	30.2	0.00	<0.1	<0.1	<0.1	21.3
	7/22/2013	10:30	29.8	0.00	4	0.2	0.1	18.9
	10/22/2013	9:58	30.0	0	<0.1	<0.1	0.2	21.4
	3/13/2014	12:45	30.0	0	<0.1	<0.1	0.2	22
GP35	2/15/2011	10:10	30.2	0.00	<0.1	<0.1	0.2	21.0
	5/2/2011	11:07	30.2	0.00	2	0.1	<0.1	22.0
	7/28/2011	15:01	29.9	0.00	<0.1	<0.1	<0.1	20.2
	10/25/2011	13:20	30.0	0.05	<0.1	<0.1	1.5	19.1
	2/2/2012	10:14	29.4	0.00	<0.1	<0.1	<0.1	21.3
	4/20/2012	11:42	29.8	0.00	2	0.1	0.1	21.3
	7/12/2012		30.1	0.00	<0.1	<0.1	<0.1	20.4
	10/18/2012	14:44	28.3	0.00	<0.1	<0.1	0.4	21.2
	1/28/2013	8:56	29.9	0.00	<0.1	<0.1	1.4	18.7
	4/16/2013	8:47	30.2	0.00	<0.1	<0.1	0.7	19.0
	7/22/2013	10:33	29.8	0.00	4	0.2	1.6	18.0
	10/22/2013	10:01	30.0	0	<0.1	<0.1	2.9	16.6
	3/13/2014	12:57	30.0	0	<0.1	<0.1	0.2	21.6
GP36	2/15/2011	8:57	30.2	0.00	<0.1	<0.1	0.9	20.9
	5/2/2011	10:06	30.2	0.00	<0.1	<0.1	<0.1	21.8
	7/28/2011	13:33	29.9	0.00	<0.1	<0.1	0.2	20.5
	10/25/2011	11:55	30.0	-0.03	2	0.1	3.2	19.1
	2/2/2012	9:03	29.4	0.00	<0.1	<0.1	0.1	21.4
	4/20/2012	9:25	29.8	0.00	2	0.1	0.3	21.5
	7/12/2012		30.1	0.02	8	0.4	3.2	17.6
	10/18/2012	13:48	28.3	0.00	<0.1	<0.1	1.2	20.5
	1/28/2013	8:06	29.9	0.00	<0.1	<0.1	2.6	18.9
	4/16/2013	7:38	30.2	0.00	<0.1	<0.1	1.1	15.6
	7/22/2013	9:25	29.8	0.00	<0.1	<0.1	4.8	15.4
	10/22/2013	8:04	30.0	0	<0.1	<0.1	3	20.4
	3/13/2014	9:25	30.0	0	2	0.1	0.5	22

Table 3-9A
Historical Gas Probe Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Barometric Pressure (inches Hg)	Vacuum inches H_2O	LEL (%)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
GP37	2/15/2011	8:55	30.2	0.00	<0.1	<0.1	1.3	20.3
	5/2/2011	10:09	30.2	0.00	<0.1	<0.1	0.2	21.8
	7/28/2011	13:37	29.9	0.00	<0.1	<0.1	0.1	20.5
	10/25/2011	11:57	30.0	0.05	<0.1	<0.1	2.8	19.0
	2/2/2012	9:06	29.4	0.00	<0.1	<0.1	0.1	21.7
	4/20/2012	9:26	29.8	0.00	2	0.1	0.3	21.4
	7/12/2012		30.1	0.02	10	0.5	3.5	17.3
	10/18/2012	13:47	28.3	0.00	16	0.8	4.2	15.9
	1/28/2013	8:05	29.9	0.00	<0.1	<0.1	2.9	18.2
	4/16/2013	7:35	30.2	0.00	<0.1	<0.1	2.1	17.1
	7/22/2013	9:22	29.8	0.00	<0.1	<0.1	<0.1	19.3
	10/22/2013	8:00	30.0	0	<0.1	<0.1	0.2	22.1
	3/13/2014	9:22	30.0	0	<0.1	<0.1	0.3	22.2
MW-13	6/19/2000	12:33		-1.6	<0.1	<0.1	<0.1	21.8
	6/28/2000	8:37	30.0	-1.4	<0.1	<0.1	<0.1	21.5
	7/11/2000	14:20	30.0	-1.3	<0.1	<0.1	<0.1	21.2
	7/18/2000	6:46	30.1	-0.8	<0.1	<0.1	<0.1	21.3
	10/17/2000	15:40	30.2	-0.4	<0.1	<0.1	<0.1	21.5
	1/23/2001	8:36	30.2	-0.9	<0.1	<0.1	<0.1	21.7
	4/24/2001	15:48	30.2	-1.4	<0.1	<0.1	<0.1	21.2
	7/19/2001	9:42	30.0	-0.5	<0.1	<0.1	<0.1	21.8
	10/23/2001	12:47	29.5	-1.5	<0.1	<0.1	<0.1	20.7
	11/21/2001	Gas Extraction System Down for Repairs						
	11/27/2001	11:05	29.9	0.12	--	66.4	34.0	0.3
	11/27/2001	12:40						
	1/24/2002	10:15	30.0	-1.2	<0.1	<0.1	<0.1	20.4
	4/18/2002	13:05	29.8	-1.5	2	0.1	<0.1	19.8
	7/18/2002	7:23	30.0	-0.26	--	6.8	4.5	18.1
	10/17/2002	11:00	30.0	-0.8	<0.1	<0.1	<0.1	20.3
	1/16/2003	11:00	30.2	-0.78	<0.1	<0.1	<0.1	18.6
	4/24/2003	7:58	30.0	-0.8	<0.1	<0.1	<0.1	20.5
	8/1/2003	8:57	29.9	-1.0	<0.1	<0.1	<0.1	20.0
	10/21/2003	8:40	29.9	-0.3	<0.1	<0.1	<0.1	19.7
	1/20/2004	11:26	30.4	-0.88	<0.1	<0.1	<0.1	18.1
	4/20/2004	10:50	29.9	-0.72	<0.1	<0.1	<0.1	20.7
	10/26/2004	8:17	30.1	-0.45	<0.1	<0.1	<0.1	20.2
	1/25/2005	8:20	29.9	-0.85	<0.1	<0.1	<0.1	20.0
	7/21/2005	8:47	30.0	-0.2	<0.1	<0.1	<0.1	19.8
	1/24/2006	8:30	29.7	-0.40	<0.1	<0.1	<0.1	21.1
	4/20/2006	15:30	29.9	-1.40	<0.1	<0.1	<0.1	21.1

Table 3-9A
Historical Gas Probe Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring Points	Date	Time (Clock)	Barometric Pressure (inches Hg)	Vacuum inches H_2O	LEL (%)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
MW-13 continued	7/19/2006	10:03	30.0	-0.60	<0.1	<0.1	<0.1	19.9
	10/27/2006	10:50	29.9	-1.10	<0.1	<0.1	<0.1	20.5
	1/18/2007	9:57	30.1	-0.60	<0.1	<0.1	0.4	22.1
	1/18/2007	9:57	30.1	-0.60	<0.1	<0.1	0.4	22.1
	3/5/2008	11:02	29.5	0.00	<0.1	<0.1		
	5/8/2008	12:12	29.1	-0.80	<0.1	<0.1	<0.1	20.2
	7/30/2008	Inaccessible						
	10/16/2008	10:15	30.3	-0.55	<0.1	<0.1	<0.1	20.7
	1/29/2009	13:42	30.0	-0.70	--	42.6	42.2	5.0
	2/27/2009	10:42	30.0	-2.00	<0.1	<0.1	<0.1	20.5
	4/29/2009	14:00	30.3	0.05	<0.1	<0.1	<0.1	19.5
	7/29/2009	9:40	29.8	-0.55	<0.1	<0.1	<0.1	20.3
	10/14/2009	10:10	30.2	-0.58	--	8.6	7.0	17.6
	1/26/2010	12:46	29.9	-1.00	<0.1	<0.1	0.2	20.9
	5/28/2010	9:16	29.9	0.05	--	69.2	26.1	1.0
	7/21/2010	10:02	30.0	-0.45	<0.1	< 0.1	<0.1	20.1
	10/27/2010	8:47	29.4	-0.40	--	15.7	9.7	13.8
	2/15/2011	9:36	30.2	-0.50	<0.1	< 0.1	0.2	21.0
	5/2/2011	10:43	30.2	-0.60	<0.1	<0.1	<0.1	22.0
	7/28/2011	14:39	29.9	-0.50	<0.1	<0.1	<0.1	20.4
	10/25/2011	12:32	30.0	-0.25	<0.1	<0.1	<0.1	20.8
	2/2/2012	9:46	29.4	-0.80	<0.1	<0.1	0.1	21.5
	4/20/2012	11:16	29.8	0.05	2	0.1	0.1	21.4
	7/12/2012		30.1	-0.16	<0.1	<0.1	<0.1	20.0
	10/18/2012	14:23	28.3	-0.07	<0.1	<0.1	<0.1	20.0
	1/28/2013	8:35	29.9	-0.20	<0.1	<0.1	<0.1	21.1
	4/16/2013	8:15	30.2	-0.50	<0.1	<0.1	<0.1	21.2
	7/22/2013	10:01	29.8	-0.15	22	1.1	0.1	19.1
	10/22/2013	9:33	30.0	-0.06	<0.1	<0.1	0.1	21.5
	3/13/2014	10:44	30.0	-0.05	--	68.9[(2)]	31	0.0

Red values indicate exceedance of 50% of Methane Lower Explosive Limit (LEL) of 5% methane.

Checked by: OB

NOTES:
(1) Reading may be biased low because of a broken sample port valve.
(2) The blower was not functioning properly and is being replaced in April 2014.

Table 3-9B
Historical Gas Probe Monitoring Data
Borrow Pit
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

DATE	TIME (days)	GP-10		GP-11		GP-12		GP-13		GP-14		GP-15		MW-14		COMMENTS
		Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	
5/13/1999	Pre-Startup	-0.01	1.0	0.15	<0.1	0.1	73.5	0.0	56.3	-0.03	57.4	-0.03	46.2	-0.04	63.8	
5/13/1999	0.1	-0.12	0.8	--	--	-3.0	18.1	--	--	--	--	--	--	--	--	Blower on at 1500 hours
5/15/1999	1.9	0.00	0.7	0.00	<0.1	-2.0	<0.1	-2.0	8.2	-0.80	2.7	-0.59	1.3	-1.5	5.1	
5/16/1999	2.9	0.00	0.6	0.10	<0.1	-2.0	<0.1	-2.0	5.8	-1.0	2.0	-0.40	<0.1	-1.0	<0.1	
5/17/1999	3.9	-0.20	0.3	-0.10	<0.1	-4.0	<0.1	-2.5	<0.1	-1.5	<0.1	-0.55	<0.1	--	--	
5/18/1999	4.9	-0.20	<0.1	0.00	<0.1	S	<0.1	-3.0	<0.1	-2.5	<0.1	-1.5	<0.1	-2.0	<0.1	
5/19/1999	6.0	0.03	0.2	0.00	<0.1	-3.0	<0.1	-1.5	<0.1	-1.5	<0.1	-1.0	<0.1	-2.0	<0.1	
5/20/1999	6.7	0.00	0.1	0.03	<0.1	-3.0	<0.1	-1.5	<0.1	-1.5	<0.1	-0.72	<0.1	-1.5	<0.1	
5/21/1999	7.7	0.00	<0.1	-0.10	<0.1	-3.0	<0.1	-2.0	<0.1	-1.5	<0.1	-0.60	<0.1	-1.5	<0.1	
5/24/1999	10.9	0.00	<0.1	0.00	<0.1	-3.0	<0.1	-2.0	<0.1	-1.5	<0.1	-0.55	<0.1	-1.5	<0.1	
5/26/1999	12.7	-2.0	<0.1	0.00	<0.1	-2.8	<0.1	-2.0	<0.1	-1.5	<0.1	-0.70	<0.1	-1.5	<0.1	
5/27/1999	14.0	-0.58	<0.1	0.03	<0.1	-3.0	<0.1	-2.0	<0.1	-1.5	<0.1	-0.68	<0.1	-1.5	<0.1	
6/1/1999	18.7	-0.46	<0.1	-0.14	<0.1	-3.0	<0.1	-2.0	<0.1	-0.94	<0.1	-0.58	<0.1	-1.5	<0.1	
6/3/1999	20.7	-2.9	<0.1	0.08	<0.1	-2.5	<0.1	-1.9	<0.1	-1.2	<0.1	-0.66	<0.1	-1.4	<0.1	
6/7/1999	24.7	-1.2	<0.1	-0.18	<0.1	-2.5	<0.1	-1.8	<0.1	-1.0	0.4	-0.80	<0.1	-1.5	<0.1	
6/9/1999	26.7	-1.5	<0.1	0.00	<0.1	-0.42	<0.1	-0.30	<0.1	-0.16	<0.1	-0.06	<0.1	-0.24	<0.1	Blower Off
6/11/1999	28.7	0.66	<0.1	0.10	<0.1	-2.0	<0.1	-1.5	<0.1	-1.0	<0.1	-0.64	<0.1	-1.2	<0.1	Smaller Replacement Generator
6/16/1999	34.0	-0.10	0.4	-0.06	<0.1	-2.6	<0.1	-2.0	<0.1	-1.2	<0.1	-0.68	<0.1	-1.4	<0.1	Permanent Power Service Hook-up
6/21/1999	37.9	0.00	<0.1	0.00	<0.1	-2.4	<0.1	-1.8	<0.1	-1.1	<0.1	-0.68	<0.1	-1.3	<0.1	
6/25/1999	40.7	0.00	6.1	0.00	<0.1	-2.6	<0.1	-2.0	<0.1	-1.4	<0.1	-0.72	<0.1	-1.4	<0.1	
7/2/1999	47.7	-1.3	<0.1	0.00	<0.1	-2.6	<0.1	-2.0	<0.1	-1.3	<0.1	-0.70	<0.1	-1.4	<0.1	
7/6/1999	51.9	-2.3	<0.1	0.00	<0.1	-2.4	<0.1	-1.8	<0.1	-1.2	<0.1	-0.48	<0.1	-1.3	<0.1	
7/9/1999	53.9	-1.5	<0.1	0.00	<0.1	-2.5	<0.1	-1.8	<0.1	-0.82	<0.1	-0.48	<0.1	-1.3	<0.1	
7/12/1999	56.7	-1.5	<0.1	0.00	<0.1	-2.7	<0.1	-1.9	<0.1	-0.91	<0.1	-0.56	<0.1	-1.1	<0.1	
7/19/1999	63.9	-0.6	<0.1	0.00	<0.1	-2.9	<0.1	-0.6	<0.1	-1.0	<0.1	-0.56	<0.1	-1.4	<0.1	
7/27/1999	71.9	-1.1	<0.1	0.00	<0.1	-2.8	<0.1	-1.9	<0.1	-1.0	<0.1	-0.45	<0.1	-1.2	<0.1	
8/3/1999	78.6	-1.2	<0.1	0.00	<0.1	-2.8	<0.1	-1.9	<0.1	-1.00	<0.1	-0.58	<0.1	-1.5	<0.1	
8/10/1999	93.9	0.0	<0.1	0.00	<0.1	-2.7	<0.1	-1.8	<0.1	-1.00	<0.1	-0.60	<0.1	-1.1	<0.1	
8/17/1999	100.7	0.0	<0.1	0.00	<0.1	-2.6	<0.1	-1.8	<0.1	-1.00	<0.1	-0.55	<0.1	-1.1	<0.1	
8/25/1999	108.7	0.0	<0.1	0.00	<0.1	-2.7	<0.1	-2.0	<0.1	-1.10	<0.1	-0.60	<0.1	-1.2	<0.1	
9/1/1999	115.7	0.0	<0.1	0.00	<0.1	-2.6	<0.1	-2.0	<0.1	-1.00	<0.1	-0.56	<0.1	-1.1	<0.1	
9/7/1999	121.9	0.0	<0.1	0.00	<0.1	-2.3	<0.1	-1.5	<0.1	-1.00	<0.1	-0.50	<0.1	-1.0	<0.1	
9/14/1999	128.7	0.0	<0.1	0.00	<0.1	-2.3	<0.1	-1.7	<0.1	-1.10	<0.1	-0.50	<0.1	-0.9	<0.1	
9/22/1999	136.9	0.0	<0.1	0.00	<0.1	-1.8	<0.1	-1.3	<0.1	-0.80	<0.1	-0.45	<0.1	-0.7	<0.1	
10/5/1999	149.7	0.0	<0.1	0.00	<0.1	-1.7	<0.1	-1.2	<0.1	-1.20	<0.1	-0.70	<0.1	-0.7	<0.1	
10/19/1999	163.9	0.0	<0.1	0.00	<0.1	-1.5	<0.1	-1.0	<0.1	-1.00	<0.1	-0.54	<0.1	-0.7	<0.1	
10/29/1999	173.7	0.0	<0.1	0.00	<0.1	-1.6	<0.1	-1.1	<0.1	-1.00	<0.1	-0.56	<0.1	-0.7	<0.1	
11/18/1999	193.9	0.0	<0.1	0.00	<0.1	-1.1	<0.1	-0.8	<0.1	-0.38	<0.1	-0.22	<0.1	-0.4	<0.1	
12/8/1999	214.0	-0.2	<0.1	-0.10	<0.1	-1.6	<0.1	-1.2	<0.1	-1.00	<0.1	-0.60	<0.1	-0.4	<0.1	
1/11/2000	248.8	-1.2	<0.1	-0.20	<0.1	-2.0	<0.1	-1.8	<0.1	-1.50	<0.1	-1.10	<0.1	-1.2	<0.1	
1/24/2000	261.6	-0.06	<0.1	0.00	<0.1	-1.2	<0.1	-0.6	<0.1	-0.24	<0.1	-0.18	<0.1	-0.4	<0.1	
1/24/2000	261.7	0.00	<0.1	0.00	<0.1	0.0	<0.1	-0.04	<0.1	0.00	<0.1	0.00	<0.1	-0.14	<0.1	Gas Extraction Wells Turned Off
1/25/2000	262.7	-0.06	<0.1	0.00	<0.1	-0.06	<0.1	-0.10	<0.1	0.00	<0.1	0.00	<0.1	-0.09	<0.1	
1/27/2000	264.6	-0.40	<0.1	0.00	<0.1	-0.14	<0.1	-0.10	<0.1	-0.01	<0.1	0.00	<0.1	-0.12	<0.1	
1/29/2000	266.6	0.10	<0.1	0.01	<0.1	-0.02	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	-0.08	<0.1	
1/31/2000	268.6	0.28	<0.1	0.06	<0.1	0.09	<0.1	0.10	<0.1	0.18	<0.1	0.08	<0.1	0.02	<0.1	
2/3/2000	271.5	0.10	<0.1	-0.04	<0.1	-0.08	<0.1	-0.10	<0.1	-0.05	<0.1	0.00	<0.1	-0.16	<0.1	
2/10/2000	278.7	0.30	<0.1	0.00	<0.1	-0.10	<0.1	-0.14	<0.1	0.00	<0.1	0.00	<0.1	0.14	<0.1	
2/15/2000	283.7	0.98	<0.1	0.10	<0.1	0.10	<0.1	0.08	<0.1	0.20	<0.1	0.14	<0.1	-0.02	<0.1	
2/23/2000	291.7	0.20	<0.1	0.00	<0.1	-0.78	<0.1	-0.76	<0.1	-0.48	<0.1	-0.24	<0.1	-1.00	<0.1	
3/20/2000	319.6	-0.41	<0.1	0.00	<0.1	-0.31	<0.1	-0.30	<0.1	-0.18	<0.1	-0.08	<0.1	-0.35	<0.1	
4/21/2000	351.6	0.25	<0.1	0.00	<0.1	-0.40	<0.1	-0.40	<0.1	-0.25	<0.1	-0.10	<0.1	-0.45	<0.1	
5/1/2000	361.3	0.00	<0.1	0.00	<0.1	-0.02	<0.1	0.06	<0.1	0.10	<0.1	0.10	<0.1	-0.02	<0.1	
5/16/2000	376.8	0.00	<0.1	0.00	<0.1	-0.16	<0.1	-0.15	<0.1	-0.10	<0.1	-0.02	<0.1	-0.20	<0.1	
6/15/2000	406.8	0.00	7.1	0.02	<0.1	-0.08	<0.1	-0.06	<0.1	0.04	<0.1	-0.10	<0.1	-0.10	<0.1	
6/19/2000	410.3	0.00	3.9	--	--	--	--	--	--	--	--	--	--	--	--	EW01 Turned On.
6/28/2000	419.3	0.03	5.1	0.00	<0.1	-0.16	<0.1	-0.10	<0.1	0.00	<0.1	0.00	<0.1	-0.20	<0.1	

Table 3-9B
Historical Gas Probe Monitoring Data
Borrow Pit
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

DATE	TIME (days)	GP-10		GP-11		GP-12		GP-13		GP-14		GP-15		MW-14		COMMENTS
		Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	
7/5/2000	426.3	0.00	13.7	0.00	<0.1	--	--	--	--	--	--	--	--	--	--	
7/11/2000	432.8	0.00	9.3	0.00	<0.1	--	--	--	--	--	--	--	--	--	--	
7/18/2000	439.3	-0.60	0.3	0.08	<0.1	-0.18	<0.1	-0.14	<0.1	-0.15	<0.1	-0.06	<0.1	-0.12	<0.1	
7/26/2000	447.3	-0.38	<0.1	--	--	--	--	--	--	--	--	--	--	--	--	
8/2/2000	454.3	-0.26	<0.1	--	--	--	--	--	--	--	--	--	--	--	--	
8/10/2000	462.3	-0.72	<0.1	--	--	--	--	--	--	--	--	--	--	--	--	
8/17/2000	469.5	0.02	<0.1	0.06	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	-0.02	<0.1	EW01 Turned Off.
8/24/2000	476.3	-0.28	<0.1	--	--	--	--	--	--	--	--	--	--	--	--	
8/29/2000	481.7	-0.14	<0.1	--	--	--	--	--	--	--	--	--	--	--	--	
9/7/2000	490.3	0.00	<0.1	--	--	--	--	--	--	--	--	--	--	--	--	
9/12/2000	495.5	-0.08	<0.1	-0.04	<0.1	-0.20	<0.1	-0.14	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	
10/17/2000	530.6	-0.04	<0.1	0.00	<0.1	0.00	<0.1	-0.08	<0.1	0.00	<0.1	-0.02	<0.1	-0.06	<0.1	
11/15/2000	559.3	-0.30	<0.1	0.00	<0.1	0.00	<0.1	-0.02	<0.1	0.00	<0.1	0.00	<0.1	-0.06	<0.1	
12/14/2000	588.6	-0.40	<0.1	0.00	<0.1	-0.08	<0.1	-0.12	<0.1	-0.10	<0.1	-0.06	<0.1	-0.16	<0.1	
1/23/2001	629.0	0.00	<0.1	0.00	<0.1	-0.14	<0.1	-0.12	<0.1	-0.08	<0.1	-0.04	<0.1	-0.14	<0.1	
2/16/2001	653.3	0.00	<0.1	0.00	<0.1	-0.60	<0.1	-0.60	<0.1	-0.40	<0.1	-0.20	<0.1	-1.00	<0.1	
3/15/2001	680.2	0.10	<0.1	0.04	<0.1	0.20	<0.1	-0.18	<0.1	-0.10	<0.1	-0.04	<0.1	-0.20	<0.1	
4/24/2001	720.3	0.00	<0.1	0.00	<0.1	-0.14	<0.1	-0.16	<0.1	-0.06	<0.1	0.00	<0.1	-0.14	<0.1	
5/25/2001	750.5	-0.20	<0.1	0.00	<0.1	-0.20	<0.1	-0.20	<0.1	-0.14	<0.1	-0.08	<0.1	-0.20	<0.1	
6/20/2001	777.2	0.00	<0.1	0.00	<0.1	-0.12	<0.1	-0.12	<0.1	-0.15	<0.1	-0.07	<0.1	-0.16	<0.1	
6/28/2001	785.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Power to Blower Discovered Off
6/29/2001	786.0	0.00	<0.1	0.00	<0.1	-0.05	<0.1	0.01	<0.1	0.00	<0.1	0.05	<0.1	0.00	<0.1	
7/2/2001	789.2	0.00	<0.1	0.06	<0.1	0.10	<0.1	0.14	<0.1	0.14	<0.1	0.10	<0.1	0.08	<0.1	Power to Blower Restored
7/19/2001	807.0	-0.25	<0.1	0.00	<0.1	-0.20	<0.1	-0.15	<0.1	-0.10	<0.1	0.00	<0.1	-0.10	<0.1	
8/16/2001	835.0	0.00	<0.1	0.00	<0.1	-0.22	<0.1	-0.20	<0.1	-0.19	<0.1	-0.10	<0.1	-0.20	<0.1	
9/25/2001	875.3	0.88	3.9	0.02	<0.1	0.08	<0.1	0.02	<0.1	0.08	<0.1	0.08	<0.1	-0.06	<0.1	
9/27/2001	877.3	0.38	4.1	--	--	--	--	--	--	--	--	--	--	--	--	EW-1 Turned On
10/2/2001	882.1	0.08	6.0	0.00	<0.1	--	--	--	--	--	--	--	--	--	--	
10/12/2001	892.3	0.00	0.2	0.00	<0.1	--	--	--	--	--	--	--	--	--	--	
10/16/2001	896.1	-0.10	0.6	0.00	<0.1	--	--	--	--	--	--	--	--	--	--	
10/23/2001	908.3	1.30	4.2	0.00	<0.1	-0.12	<0.1	-0.10	<0.1	-0.08	<0.1	-0.06	<0.1	-0.18	<0.1	
10/31/2001	916.1	0.10	4.1	0.00	<0.1	--	--	--	--	--	--	--	--	--	--	
11/8/2001	924.1	0.00	<0.1	0.00	<0.1	--	--	--	--	--	--	--	--	--	--	
11/14/2001	930.2	0.00	<0.1	0.00	<0.1	-0.15	<0.1	-0.12	<0.1	-0.08	<0.1	-0.02	<0.1	-0.12	<0.1	
11/21/2001	937.3	0.00	<0.1	0.00	<0.1	0.10	<0.1	0.10	<0.1	0.10	<0.1	0.06	<0.1	0.06	<0.1	
11/27/2001	943.3	-0.06	<0.1	0.00	<0.1	-0.32	<0.1	-0.28	<0.1	-0.20	<0.1	-0.10	<0.1	-0.20	<0.1	
12/18/2001	964.1	0.00	<0.1	0.00	<0.1	0.08	<0.1	0.08	<0.1	0.06	<0.1	0.04	<0.1	0.06	<0.1	Blower Down for Repairs
1/8/2002	982.1	0.02	<0.1	0.02	<0.1	0.12	<0.1	0.06	<0.1	0.06	<0.1	0.04	<0.1	0.04	<0.1	Blower Up and Running
1/24/2002	998.1	-0.70	<0.1	0.00	<0.1	-0.36	<0.1	-0.25	<0.1	-0.20	<0.1	-0.07	<0.1	-0.21	<0.1	
2/14/2002	1019.1	0.00	<0.1	0.00	<0.1	-0.16	<0.1	-0.12	<0.1	-0.06	<0.1	0.00	<0.1	-0.20	<0.1	
3/14/2002	1047.1	0.00	<0.1	0.08	<0.1	0.08	<0.1	0.06	<0.1	0.12	<0.1	0.12	<0.1	0.00	<0.1	
4/18/2002	1082.3	0.00	<0.1	0.00	<0.1	0.10	<0.1	0.08	<0.1	0.12	<0.1	0.16	<0.1	0.00	<0.1	
5/15/2002	1109.1	0.00	<0.1	0.00	<0.1	-0.20	<0.1	-0.10	<0.1	0.00	<0.1	0.00	<0.1	-0.20	<0.1	
6/18/2002	1143.1	0.00	<0.1	0.00	<0.1	-0.18	<0.1	-0.12	<0.1	-0.06	<0.1	0.00	<0.1	-0.10	<0.1	
7/18/2002	1173.1	0.00	<0.1	0.00	<0.1	-0.06	<0.1	-0.06	<0.1	-0.06	<0.1	0.00	<0.1	-0.04	<0.1	
8/15/2002	1201.1	0.00	<0.1	0.00	<0.1	-0.10	<0.1	-0.12	<0.1	-0.10	<0.1	0.00	<0.1	-0.08	<0.1	
9/10/2002	1227.3	0.10	<0.1	0.00	<0.1	-0.08	<0.1	-0.10	<0.1	-0.04	<0.1	0.00	<0.1	-0.10	<0.1	

Table 3-9B
Historical Gas Probe Monitoring Data
Borrow Pit
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

DATE	TIME (days)	GP-10		GP-11		GP-12		GP-13		GP-14		GP-15		MW-14		COMMENTS
		Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	
10/17/2002	1264.1	-0.02	<0.1	0.00	<0.1	-0.10	<0.1	-0.08	<0.1	-0.04	<0.1	-0.04	<0.1	-0.10	<0.1	
11/19/2002	1297.1	-0.12	<0.1	0.00	<0.1	-0.18	<0.1	-0.06	<0.1	<0.08	<0.1	-0.04	<0.1	-0.16	<0.1	
12/11/2002	1319.1	-0.08	<0.1	0.00	<0.1	-0.02	<0.1	-0.10	<0.1	-0.08	<0.1	-0.02	<0.1	-0.10	<0.1	
1/16/2003	1345.1	0.00	<0.1	0.00	<0.1	0.01	<0.1	-0.01	<0.1	0.00	<0.1	0.03	<0.1	-0.04	<0.1	
4/24/2003	1443.1	-0.1	<0.1	0.00	<0.1	-0.08	<0.1	-0.10	<0.1	0.00	<0.1	0.00	<0.1	-0.10	<0.1	
7/22/2003	1532.1	-0.66	<0.1	0.00	<0.1	-0.16	<0.1	-0.18	<0.1	-0.15	<0.1	-0.08	<0.1	-0.08	<0.1	Power to Blower Discovered Off
7/24/2003	1534.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Power to Blower Restored
10/21/2003	1623.1	0.00	<0.1	0.00	<0.1	-0.20	<0.1	-0.14	<0.1	-0.10	<0.1	0.00	<0.1	-0.06	<0.1	
1/20/2004	1683.1	-0.50	<0.1	0.00	<0.1	-0.15	<0.1	-0.20	<0.1	-0.12	<0.1	-0.06	<0.1	-0.14	<0.1	
4/20/2004	1774.1	0.10	<0.1	0.04	<0.1	-0.04	<0.1	0.10	<0.1	0.22	<0.1	0.12	<0.1	0.04	<0.1	
7/27/2004	1872.1	-0.08	<0.1	0.00	<0.1	-0.10	<0.1	-0.08	<0.1	0.00	<0.1	0.00	<0.1	-0.08	<0.1	
10/26/2004	1963.1	-0.58	<0.1	0.00	<0.1	-0.30	<0.1	-0.15	<0.1	-0.08	<0.1	-0.04	<0.1	-0.18	<0.1	
1/25/2005	2054.1	-0.03	<0.1	0.00	<0.1	0.14	<0.1	0.08	<0.1	0.10	<0.1	0.10	<0.1	-0.03	<0.1	
4/13/2005	2131.1	-0.32	<0.1	0.00	<0.1	-0.30	<0.1	-0.18	<0.1	-0.16	<0.1	-0.12	<0.1	-0.20	<0.1	
7/21/2005	2330.1	-0.06	<0.1	0.00	<0.1	-0.21	<0.1	-0.25	<0.1	-0.20	<0.1	-0.08	<0.1	-0.20	<0.1	
10/20/2005	2421.1	-0.10	<0.1	0.00	<0.1	-0.02	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	
11/3/2005	2435.1	-0.14	<0.1	0.00	<0.1	-0.10	<0.1	-0.04	<0.1	0.00	<0.1	0.00	<0.1	-0.06	<0.1	
11/17/2005	2449.1	-0.10	<0.1	0.00	<0.1	-0.20	<0.1	-0.14	<0.1	0.00	<0.1	-0.08	<0.1	-0.06	<0.1	
12/8/2005	2470.1	-0.10	<0.1	0.00	<0.1	0.26	<0.1	0.18	<0.1	0.20	<0.1	--	--	-0.04	<0.1	
1/24/2006	2517.1	0.10	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.02	<0.1	0.00	<0.1	-0.40	<0.1	
4/20/2006	2603.3	0.06	<0.1	0.06	<0.1	-0.06	<0.1	-0.06	<0.1	0.14	<0.1	0.10	<0.1	-0.08	<0.1	
7/19/2006	2692.2	-0.14	<0.1	0.00	<0.1	-0.08	<0.1	-0.04	<0.1	0.00	<0.1	0.00	<0.1	-0.08	<0.1	
10/27/2006	2792.2	0.21	<0.1	0.02	<0.1	0.00	<0.1	-0.01	<0.1	0.04	<0.1	0.00	<0.1	-0.10	<0.1	
1/18/2007	2874.2	0.08	<0.1	0.00	<0.1	0.06	<0.1	0.08	<0.1	0.06	<0.1	0.04	<0.1	0.00	<0.1	
4/26/2007	2972.2	0.44	<0.2	1.00	<0.2	-0.19	<0.2	-0.07	<0.2	0.07	<0.1	-0.14	<0.1	-0.13	<0.1	
7/26/2007	3063.2	0.00	<0.1	0.03	<0.1	0.17	<0.1	0.15	<0.1	0.07	<0.1	0.18	<0.1	0.00	<0.1	
3/5/2008	3286.2	S	<0.1	S	<0.1	S	<0.1	S	<0.1	S	<0.1	S	<0.1	S	<0.1	
4/11/2008	3323.2	0.07	NA	0.00	NA	0.02	NA	-0.12	NA	0.09	NA	0.05	NA	NA	NA	Pressure readings only
5/8/2008	3361.2	0.00	<0.1	0.00	<0.1	-0.13	<0.1	-0.02	<0.1	0.03	<0.1	0.05	<0.1	0.00	<0.1	
7/30/2008	3444.2	0.04	<0.1	0.03	<0.1	-0.03	<0.1	0.04	<0.1	0.07	<0.1	0.03	<0.1	0.07	<0.1	
10/16/2008	3522.2	-0.03	<0.1	0.01	<0.1	-0.08	<0.1	-0.04	<0.1	-0.01	<0.1	0.01	<0.1	0.02	<0.1	
1/29/2009	3628.2	0.1	0.2	0.01	0.2	0.02	0.2	NM	NM	0.20	0.2	0.03	0.2	-0.07	<0.1	Ambient Methane Level = 0.2%
2/27/2009	3657.2	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	-0.40	<0.1	
4/29/2009	3718.2	-0.02	<0.1	0.03	<0.1	-0.2	<0.1	-0.04	<0.1	0.02	<0.1	0.04	<0.1	-1.00	<0.1	
7/29/2009	3809.2	-0.01	0.2	0.00	0.2	-0.20	0.2	-0.14	0.2	-0.15	0.2	-0.04	0.2	-0.08	0.2	Ambient Methane Level = 0.2%
10/14/2009	3886.2	0	<0.1	0.00	<0.1	0.10	<0.1	0.07	<0.1	0.08	<0.1	0.08	<0.1	0.11	<0.1	
1/26/2010	3990.2	0.05	<0.1	0.04	<0.1	-0.19	<0.1	-0.17	<0.1	0.08	<0.1	-0.07	<0.1	-0.22	<0.1	
5/28/2010	4112.2	0.4	0.2	0.01	0.1	0.07	0.2	0.05	0.2	0.05	0.2	0.04	0.2	0.06	0.2	Ambient Methane Level = 0.2%
7/21/2010	4166.2	-0.05	<0.1	0.00	<0.1	-0.15	<0.1	-0.15	<0.1	-0.10	<0.1	0.00	<0.1	-0.10	<0.1	
10/27/2010	4264.2	0.04	<0.1	0.03	<0.1	-0.10	<0.1	-0.60	<0.1	-0.02	<0.1	0.02	<0.1	0.00	<0.1	
2/15/2011	4375.2	0.02	<0.1	0.00	<0.1	0.03	<0.1	0.02	<0.1	0.04	<0.1	0.02	<0.1	0.02	<0.1	
5/2/2011	4451.2	0.00	<0.1	0.00	<0.1	0.04	<0.1	0.05	0.1	0.00	0.1	-0.02	0.1	0.00	<0.1	
7/28/2011	4538.2	0.00	<0.1	0.00	<0.1	0.15	<0.1	0.10	<0.1	0.15	<0.1	0.00	<0.1	0.05	<0.1	
10/25/2011	4627.2	0.07	<0.1	0.03	<0.1	0.21	<0.1	0.20	<0.1	0.22	<0.1	0.10	<0.1	0.12	<0.1	
2/2/2012	4727.2	0.00	<0.1	-0.14	<0.1	-0.08	<0.1	-0.04	<0.1	0.00	<0.1	0.02	<0.1	-0.06	<0.1	
4/20/2012	4805.2	-0.05	0.1	-0.05	0.1	-0.25	0.1	-0.25	0.1	0.15	0.1	0.05	0.1	0.15	0.1	Ambient Methane Level = 0.1%
7/12/2012	4888.2	0.00	<0.1	0.00	<0.1	0.05	<0.1	0.03	<0.1	0.04	<0.1	0.02	<0.1	0.04	<0.1	
10/18/2012	4986.2	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	
1/28/2013	5088.2	-0.15	<0.1	0.00	3.1	-0.13	<0.1	-0.10	<0.1	-0.10	<0.1	-0.05	<0.1	-0.13	<0.1	
4/16/2013	5166.2	0.00	<0.1	0.03	<0.1	-0.20	<0.1	-0.20	<0.1	-0.20	<0.1	-0.50	<0.1	-0.12	<0.1	
7/22/2013	5263.2	0	<0.1	0.00	<0.1	-0.10	<0.1	-0.10	<0.1	-0.10	0.2	0.00	<0.1	0.00	<0.1	Ambient Methane Level = 0%
10/22/2013	5355.2	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	
3/13/2014	5497.2	0.00	0.2	0.00	0.2	0.00	0.2	0.00	0.2	0.00	0.2	0.00	0.2	0.00	0.2	

Checked by: OB
NM - Not Measured
S = Pressure gage short-circuited and readings were not representative.

Table 3-9C
Historical Gas Probe Monitoring Data
Wycliffe Estates Subdivision
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

DATE	TIME (days)	GP-20		GP-21		GP-22		GP-23		GP-24		GP-25		COMMENTS
		Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	
5/13/1999	Pre-Startup	0.06	77.2	-0.05	47.6	0.00	53.7	-0.03	36.5	-0.05	10.8	-0.09	<0.1	
5/13/1999	0.9	-0.80	<0.1	-0.70	0.9	-0.30	48.4	-0.36	36.1	-0.30	1.0	-0.10	<0.1	
5/14/1999	1.9	-0.68	<0.1	-0.64	0.4	-0.21	50.3	-0.30	35.3	-0.28	<0.1	0.00	<0.1	
5/15/1999	2.9	-0.70	<0.1	-0.60	<0.1	-0.22	46.3	-0.30	24.1	-0.26	<0.1	-0.10	<0.1	
5/16/1999	3.9	-1.5	<0.1	-1.2	<0.1	-0.90	47.6	-0.60	20.6	-0.50	<0.1	-0.50	<0.1	
5/17/1999	4.9	-1.5	<0.1	-1.5	0.7	-0.75	48.9	-0.60	22.4	-0.50	<0.1	-0.20	<0.1	
5/18/1999	6.0	-1.0	<0.1	-0.95	0.5	-0.38	47.2	-0.41	19.5	-0.40	<0.1	0.04	<0.1	
5/19/1999	6.7	-0.96	<0.1	-0.96	0.2	-0.44	48.9	-0.44	17.4	-0.38	<0.1	0.00	<0.1	
5/20/1999	7.7	-0.90	<0.1	-0.92	<0.1	-0.46	51.3	-0.41	10.8	-0.36	<0.1	-0.10	<0.1	
5/21/1999	10.9	-0.84	<0.1	-0.88	<0.1	-0.50	49.2	-0.40	4.9	-0.36	<0.1	-0.18	<0.1	
5/24/1999	12.8	-0.82	<0.1	-0.72	<0.1	-0.38	36.4	-0.40	5.9	-0.28	<0.1	0.00	<0.1	
5/26/1999	14.0	-0.76	<0.1	-0.78	<0.1	-0.24	24.1	-0.34	3.9	-0.27	<0.1	0.00	<0.1	
5/27/1999	18.7	-0.70	<0.1	-0.72	<0.1	-0.24	22.7	-0.28	0.3	-0.22	<0.1	0.00	<0.1	
6/1/1999	20.7	-1.1	<0.1	-1.1	<0.1	-0.81	30.1	-0.56	<0.1	-0.41	<0.1	-0.36	<0.1	
6/3/1999	24.7	-0.11	<0.1	-0.10	<0.1	-0.14	31.7	-0.08	<0.1	-0.04	<0.1	-0.10	<0.1	
6/7/1999	26.7	-0.60	<0.1	-0.55	<0.1	-0.28	25.7	0.08	<0.1	-0.19	<0.1	-0.02	<0.1	
6/9/1999	26.9	-0.74	<0.1	-0.72	<0.1	-0.24	21.7	-0.34	<0.1	-0.24	<0.1	0.00	<0.1	Blower Off
6/11/1999	28.9	-0.70	<0.1	-0.66	<0.1	-0.48	30.3	-0.30	<0.1	-0.24	<0.1	-0.14	<0.1	Smaller Replacement Generator
6/16/1999	34.0	-0.85	<0.1	-0.92	<0.1	-0.50	32.1	-0.50	<0.1	-0.30	<0.1	0.11	<0.1	Permanent Power Service Hook-up
6/21/1999	37.9	-0.87	<0.1	-0.74	<0.1	-0.18	23.7	--	--	-0.36	<0.1	0.00	<0.1	GP-23 covered with soil
6/25/1999	40.7	-0.72	<0.1	-0.94	<0.1	-0.54	31.9	-0.48	<0.1	-0.46	<0.1	-0.20	<0.1	
7/2/1999	47.7	-0.90	<0.1	-0.82	<0.1	-0.62	3.3	-0.50	<0.1	-0.46	<0.1	-0.40	<0.1	
7/6/1999	51.9	-0.68	<0.1	-0.66	<0.1	-0.30	10.2	-0.34	<0.1	-0.24	<0.1	0.00	<0.1	
7/9/1999	53.9	-1.3	<0.1	-1.1	<0.1	-0.85	14.6	-0.48	<0.1	-0.40	<0.1	-0.60	<0.1	
7/12/1999	56.7	-0.74	<0.1	-0.66	<0.1	-0.20	<0.1	-0.30	<0.1	-0.10	<0.1	0.00	<0.1	
7/19/1999	63.9	-0.78	<0.1	-0.72	<0.1	-0.26	8.3	-0.32	<0.1	-0.26	<0.1	0.00	<0.1	
7/27/1999	71.9	-0.80	<0.1	-0.78	<0.1	-0.24	14.1	-0.34	<0.1	-0.10	<0.1	0.00	<0.1	
8/3/1999	78.6	-0.88	<0.1	-0.80	<0.1	-0.40	8.6	-0.40	<0.1	-0.28	<0.1	-0.10	<0.1	
8/10/1999	93.9	-0.81	<0.1	-0.78	<0.1	-0.42	14.0	-0.38	<0.1	-0.22	<0.1	-0.14	<0.1	
8/17/1999	100.7	-0.78	<0.1	-0.67	<0.1	-0.38	11.7	-0.30	<0.1	-0.21	<0.1	-0.08	<0.1	
8/25/1999	108.7	-0.80	<0.1	-0.70	<0.1	-0.54	11.9	-0.32	<0.1	0.00	<0.1	0.00	<0.1	
9/1/1999	115.7	-0.70	<0.1	-0.60	<0.1	-0.40	11.4	-0.30	<0.1	-0.20	<0.1	-0.10	<0.1	
9/7/1999	121.9	-0.52	<0.1	-0.52	<0.1	-0.20	0.3	-0.25	<0.1	-0.18	<0.1	0.00	<0.1	
9/14/1999	128.7	-0.70	<0.1	-0.46	<0.1	-0.32	6.3	-0.30	<0.1	-0.28	<0.1	-0.16	<0.1	
9/22/1999	136.9	-0.50	<0.1	-0.46	<0.1	-0.12	5.4	-0.20	<0.1	-0.15	<0.1	0.00	<0.1	
10/5/1999	149.7	-0.38	<0.1	-0.38	<0.1	-0.22	1.8	-0.16	<0.1	-0.16	<0.1	0.00	<0.1	
10/19/1999	163.9	-0.38	<0.1	-0.32	<0.1	-0.28	<0.1	-0.18	<0.1	0.00	<0.1	0.00	<0.1	
10/29/1999	173.7	-0.49	<0.1	-0.42	<0.1	-0.54	<0.1	-0.28	<0.1	0.12	<0.1	-0.05	<0.1	
11/18/1999	193.9	-0.24	<0.1	-0.18	<0.1	-0.05	0.4	0.04	<0.1	0.00	<0.1	0.00	<0.1	
12/8/1999	214.0	-0.40	<0.1	-0.36	<0.1	-0.36	<0.1	0.14	<0.1	0.00	<0.1	0.00	<0.1	
1/11/2000	248.8	-0.80	<0.1	-0.70	<0.1	-1.30	<0.1	-0.43	<0.1	-0.30	<0.1	-0.50	<0.1	
1/24/2000	261.6	-0.32	<0.1	-0.20	<0.1	-0.12	<0.1	-0.15	<0.1	-0.08	<0.1	-0.35	<0.1	
1/24/2000	261.7	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	Gas Extraction Wells Turned Off
1/25/2000	262.7	-0.04	<0.1	0.00	<0.1	0.00	0.7	-0.06	<0.1	0.00	<0.1	0.00	<0.1	
1/26/2000	263.4	--	--	--	--	-0.09	0.4	--	--	--	--	--	--	
1/27/2000	264.6	-0.14	<0.1	-0.08	<0.1	-0.20	<0.1	-0.06	<0.1	0.00	<0.1	-0.10	<0.1	
1/29/2000	266.6	0.00	<0.1	0.00	<0.1	0.06	<0.1	0.00	<0.1	0.00	<0.1	0.04	<0.1	
1/31/2000	268.6	0.10	<0.1	0.06	<0.1	0.16	<0.1	0.04	<0.1	0.00	<0.1	0.10	<0.1	
2/3/2000	271.5	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	
2/10/2000	278.7	0.08	<0.1	0.00	<0.1	0.14	4.2	0.14	<0.1	0.04	<0.1	0.14	<0.1	Gas probe development prior to readings
2/11/2000	279.7	--	--	--	--	-0.02	<0.1	--	--	--	--	--	--	
2/15/2000	283.7	0.26	<0.1	0.18	<0.1	0.18	<0.1	0.12	<0.1	0.20	<0.1	0.50	<0.1	

Table 3-9C
Historical Gas Probe Monitoring Data
Wycliffe Estates Subdivision
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

DATE	TIME (days)	GP-20		GP-21		GP-22		GP-23		GP-24		GP-25		COMMENTS
		Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	
2/18/2000	286.7	--	--	--	--	0.05	<0.1	--	--	--	--	--	--	
2/23/2000	291.7	-0.14	<0.1	-0.18	<0.1	-0.08	<0.1	0.00	<0.1	-0.02	<0.1	0.00	<0.1	
2/29/2000	296.7	--	--	--	--	0.42	0.7	--	--	--	--	--	--	
3/8/2000	305.4	--	--	--	--	0.22	<0.1	--	--	--	--	--	--	
3/14/2000	311.3	--	--	--	--	-0.03	<0.1	--	--	--	--	--	--	
3/16/2000	313.6	--	--	--	--	0.10	<0.1	--	--	--	--	--	--	
3/20/2000	319.6	-0.10	<0.1	-0.15	<0.1	-0.21	<0.1	-0.10	<0.1	-0.05	<0.1	-0.15	<0.1	
3/24/2000	321.4	--	--	--	--	0.38	0.3	--	--	--	--	--	--	
3/27/2000	324.4	--	--	--	--	0.06	<0.1	--	--	--	--	--	--	
3/30/2000	327.4	--	--	--	--	-0.10	<0.1	--	--	--	--	--	--	
4/4/2000	332.4	--	--	--	--	-0.20	<0.1	--	--	--	--	--	--	
4/6/2000	334.4	--	--	--	--	-0.54	<0.1	--	--	--	--	--	--	
4/11/2000	339.4	--	--	--	--	0.11	<0.1	--	--	--	--	--	--	
4/13/2000	341.6	--	--	--	--	0.11	<0.1	--	--	--	--	--	--	
4/18/2000	346.4	--	--	--	--	0.00	<0.1	--	--	--	--	--	--	
4/21/2000	351.6	-0.15	<0.1	-0.05	<0.1	-0.18	<0.1	-0.15	<0.1	-0.10	<0.1	-0.10	<0.1	
5/1/2000	361.3	0.00	<0.1	-0.02	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	-0.08	<0.1	
5/16/2000	376.8	--	--	--	--	--	--	--	--	--	--	--	--	
6/15/2000	406.8	--	--	--	--	--	--	--	--	--	--	--	--	
6/19/2000	410.3	-0.08	<0.1	--	--	--	--	-0.15	<0.1	--	--	--	--	EW01 Turned On
6/28/2000	419.3	0.00	<0.1	0.00	<0.1	0.02	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	
7/5/2000	426.3	0.00	<0.1	--	--	--	--	-0.02	<0.1	--	--	--	--	
7/11/2000	432.8	0.00	<0.1	--	--	--	--	0.00	<0.1	--	--	--	--	
7/18/2000	439.3	-0.06	<0.1	-0.06	<0.1	0.00	0.7	-0.08	<0.1	0.00	<0.1	-0.04	<0.1	
7/26/2000	447.3	--	--	--	--	-0.22	<0.1	--	--	--	--	--	--	
8/2/2000	454.3	--	--	--	--	0.06	1.5	--	--	--	--	--	--	
8/3/2000	455.3	--	--	--	--	-0.10	<0.1	--	--	--	--	--	--	
8/17/2000	469.5	--	--	--	--	--	--	--	--	--	--	--	--	EW01 Turned Off
10/17/2000	530.6	0.00	<0.1	0.00	<0.1	0.14	<0.1	0.16	<0.1	0.14	<0.1	0.10	<0.1	
1/23/2001	629.0	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	
4/24/2001	720.3	0.14	<0.1	-0.04	<0.1	0.14	<0.1	0.06	<0.1	0.00	<0.1	0.00	<0.1	
6/28/2001	785.5	--	--	--	--	--	--	--	--	--	--	--	--	Power to Blower Discovered Off
7/2/2001	789.2	--	--	--	--	--	--	--	--	--	--	--	--	Power to Blower Restored
7/19/2001	807.0	-0.20	<0.1	-0.10	<0.1	-0.20	<0.1	-0.10	<0.1	-0.05	<0.1	-0.20	<0.1	
9/28/2001	878.8	-0.06	<0.1	-0.08	<0.1	-0.08	<0.1	0.00	<0.1	--	--	-0.08	<0.1	GP-24 Buried w/Construction Activities
10/23/2001	908.3	0.06	<0.1	0.00	<0.1	0.20	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	EW01 Turned On 9/27/01
1/24/2002	998.1	-0.28	<0.1	-0.12	<0.1	-0.26	<0.1	-0.18	<0.1	-0.08	<0.1	0.0	<0.1	Blower Down 12/18/01 - 01/08/02
4/18/2002	1082.3	0.10	<0.1	0.17	<0.1	0.28	<0.1	0.10	<0.1	0.10	<0.1	0.32	<0.1	
7/18/2002	1173.1	0.06	<0.1	-0.06	<0.1	0.00	<0.1	0.08	<0.1	0.00	<0.1	0.00	<0.1	
10/17/2002	1264.1	-0.08	<0.1	0.02	<0.1	0.14	<0.1	-0.06	<0.1	0.02	<0.1	0.00	<0.1	
1/16/2003	1345.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.14	<0.1	0.00	<0.1	0.02	<0.1	
4/24/2003	1443.1	0.02	<0.1	-0.01	<0.1	0.00	<0.1	0.00	<0.1	-0.01	<0.1	0.08	<0.1	

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Wycliffe Estates Subdivision
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Geosyntec consultants

DATE	TIME (days)	GP-20		GP-21		GP-22		GP-23		GP-24		GP-25		COMMENTS
		Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	
7/22/2003	1532.1	-0.15	<0.1	-0.10	<0.1	0.10	<0.1	-0.10	<0.1	-0.06	<0.1	-0.20	<0.1	Power to Blower Discovered Off
7/24/2003	1534.1	--	--	--	--	--	--	--	--	--	--	--	--	Power to Blower Restored
10/21/2003	1623.1	-0.10	<0.1	-0.12	<0.1	-0.30	<0.1	-0.08	<0.1	-0.08	<0.1	-0.26	<0.1	
1/20/2004	1683.1	-0.10	<0.1	-0.10	<0.1	-0.06	<0.1	-0.04	<0.1	-0.04	<0.1	-0.05	<0.1	
4/20/2004	1774.1	0.14	<0.1	0.10	<0.1	0.16	<0.1	0.06	<0.1	0.04	<0.1	0.22	<0.1	
7/27/2004	1872.1	-0.02	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.16	<0.1	0.00	<0.1	
10/26/2004	1963.1	0.00	<0.1	0.00	<0.1	-0.14	<0.1	0.00	<0.1	0.00	<0.1	-0.10	<0.1	
1/25/2005	2054.1	0.00	<0.1	0.18	<0.1	0.17	<0.1	0.02	<0.1	0.12	<0.1	0.20	<0.1	
4/13/2005	2131.1	-0.10	<0.1	-0.15	<0.1	-0.28	<0.1	-0.10	<0.1	-0.08	<0.1	-0.28	<0.1	
7/21/2005	2330.1	-0.30	<0.1	-0.41	<0.1	-0.25	<0.1	-0.21	<0.1	-0.18	<0.1	-0.34	<0.1	
10/20/2005	2421.1	0.00	<0.1	0.14	<0.1	0.02	<0.1	0.00	<0.1	0.10	<0.1	0.04	<0.1	
1/24/2006	2517.1	0.02	<0.1	0.00	<0.1	0.00	<0.1	0.04	<0.1	0.02	<0.1	0.10	<0.1	
4/20/2006	2603.3	0.02	<0.1	0.06	<0.1	0.12	<0.1	0.02	<0.1	0.04	<0.1	0.18	<0.1	
7/19/2006	2692.2	-0.10	<0.1	0.04	<0.1	-0.06	<0.1	-0.08	<0.1	-0.04	<0.1	-0.02	<0.1	
10/27/2006	2792.2	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	
1/18/2007	2874.2	0.12	<0.1	0.00	<0.1	0.00	<0.1	0.10	<0.1	0.00	<0.1	0.26	<0.1	
4/26/2007	2972.2	0.06	<0.1	0.00	<0.1	0.11	<0.2	0.01	<0.1	0.03	<0.1	0.21	<0.1	Elevated detection limit (<0.2) due to background interference
7/26/2007	3063.2	0.00	<0.1	0.07	<0.1	0.03	<0.1	-0.03	<0.1	-0.02	<0.1	0.04	<0.1	
3/5/2008	3286.2	S	<0.1	NM	NM	S	<0.1	NM	NM	S	<0.1	NM	NM	
5/8/2008	3361.2	0.03	<0.1	0.00	1.3	0.03	<0.1	0.00	<0.1	0.02	<0.1	0.13	<0.1	GP-21 zeroed after 30 seconds
7/30/2008	3444.2	0.01	<0.1	0.05	<0.1	0.18	<0.1	0.02	<0.1	0.04	<0.1	0.15	<0.1	
10/16/2008	3522.2	0.02	<0.1	0.00	<0.1	0.04	<0.1	-0.02	<0.1	0.02	<0.1	0.02	<0.1	
1/29/2009	3628.2	0.00	0.2	NM	NM	NM	NM	-0.07	<0.1	0.01	0.2	NM	NM	Ambient Methane Level = 0.2%
2/27/2009	3628.2	NM	NM	0.01	<0.1	-0.25	<0.1	NM	NM	NM	NM	0.08	<0.1	
4/29/2009	3628.2	0.05	<0.1	0.01	<0.1	0.15	<0.1	0.01	<0.1	0.03	<0.1	0.15	<0.1	
7/29/2009	3628.2	-0.08	0.2	-0.09	0.2	-0.17	0.2	-0.06	0.2	-0.04	0.2	-0.15	0.2	Ambient Methane Level = 0.2%
10/14/2009	3628.2	0.10	<0.1	0.17	<0.1	0.04	<0.1	0.07	<0.1	0.01	<0.1	0.10	<0.1	
1-26-2010	3628.2	0.00	<0.1	0.02	<0.1	0.02	<0.1	-0.10	<0.1	0.00	<0.1	-0.13	<0.1	
5-28-2010	3628.2	0.00	0.2	0.03	0.2	0.00	0.2	0.00	0.2	0.00	0.2	0.05	0.2	Ambient Methane Level = 0.2%
7-21-2010	3628.2	-0.10	<0.1	-0.05	<0.1	-0.15	<0.1	-0.05	<0.1	0.00	<0.1	-0.15	<0.1	
10-27-2010	3628.2	0.00	<0.1	0.02	<0.1	-0.07	<0.1	-0.03	<0.1	0.05	<0.1	-0.05	<0.1	
2-15-2011	3628.2	0.10	<0.1	NM	NM	NM	NM	NM	NM	0.03	<0.1	NM	NM	
5-2-2011	3628.2	0.03	<0.1	0.04	0.1	0.00	<0.1	-0.02	<0.1	0.00	<0.1	0.04	0.1	
7-28-2011	3628.2	0.20	<0.1	0.00	<0.1	-0.20	<0.1	0.15	<0.1	0.15	<0.1	-0.50	<0.1	
10-25-2011	3628.2	0.20	<0.1	0.08	<0.1	0.25	<0.1	0.03	<0.1	0.03	<0.1	0.25	<0.1	
02-02-2012	3628.2	-0.03	<0.1	0.02	<0.1	0.00	<0.1	-0.02	<0.1	-0.02	<0.1	-0.03	<0.1	
04-20-2012	3628.2	-0.20	0.1	-0.20	0.1	0.25	0.1	0.05	0.1	0.10	0.1	0.20	0.1	Ambient Methane Level = 0.1%
07-12-2012	3628.2	0.00	<0.1	0.03	<0.1	0.05	<0.1	0.00	<0.1	0.04	<0.1	0.06	<0.1	
10-18-2012	3628.2	-0.05	<0.1	-0.03	<0.1	-0.06	<0.1	0.00	<0.1	0.00	<0.1	-0.06	<0.1	
1/28/2013	3628.2	0.00	<0.1	-0.50	<0.1	0.00	<0.1	-0.30	<0.1	0.00	<0.1	0.00	<0.1	
4/16/2013	3628.2	-0.06	<0.1	-0.06	<0.1	-0.05	<0.1	-0.50	<0.1	0.00	<0.1	0.00	<0.1	
7/22/2013	3628.2	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.02	<0.1	-0.05	<0.1	
10/22/2013	3628.2	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	0.00	<0.1	
3/13/2014	3628.2	0.00	0.2	NM	NM	0.00	0.2	NM	NM	NM	NM	NM	NM	Ambient Methane Level = 0.2%. GP-21 & GP-23 through GP-25 could not be located due to snow cover.

Checked by: OB
S = Pressure gage short-circuited and readings were not representative.
*NM = Not Measured

Table 3-10

Historical Extraction Trench Gas Monitoring Data

MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

DATE	TIME (days)	Location										COMMENTS
		RC-1		RC-2		RC-3		RC-4		RC-5		
		Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	
		Gas Extraction System Start-Up										
5/13/1999	0.1	-5.0	1.6	-4.5	25.7	-6.0	1.5	-7.0	11.6	-10	34.4	System blower started at 1500 hours with generator power.
5/14/1999	0.9	-4.0	<0.1	-5.0	8.0	-6.0	<0.1	-6.0	3.4	-10	9.1	
5/15/1999	1.9	-4.0	<0.1	-4.5	8.8	-5.5	<0.1	-6.5	3.0	-10	7.3	
5/16/1999	2.9	-4.0	<0.1	-4.0	4.5	-6.0	<0.1	-7.0	2.8	-11	6.7	
5/17/1999	3.8	-4.0	<0.1	-5.0	10.1	-6.0	<0.1	-7.0	2.1	-11	5.6	
5/18/1999	4.9	-5.0	<0.1	-5.0	8.2	-5.0	<0.1	-5.0	2.2	-5.0	5.5	
5/19/1999	6.0	-7.0	1.4	-5.5	6.7	-5.5	<0.1	-5.0	3.2	-4.5	6.6	
5/20/1999	6.7	-2.0	<0.1	-7.0	5.6	-2.0	<0.1	-5.0	3.6	-4.0	2.7	
5/21/1999	7.7	-2.0	<0.1	-7.0	6.4	-2.0	<0.1	-5.0	3.6	-4.5	5.1	
5/24/1999	10.9	-2.0	<0.1	-7.0	5.6	-2.0	<0.1	-5.0	3.7	-4.5	4.6	
5/26/1999	12.7	-2.0	<0.1	-7.0	3.4	-2.0	<0.1	-5.0	2.4	-4.0	2.9	
5/27/1999	14.0	-2.0	<0.1	-7.0	5.1	-2.0	<0.1	-5.0	3.3	-4.5	4.3	
6/1/1999	18.7	-2.0	<0.1	-6.5	6.3	-2.0	<0.1	-5.0	3.8	-4.0	6.6	
6/3/1999	20.7	-2.0	<0.1	-7.0	4.4	-2.0	<0.1	-5.0	2.5	-4.5	2.8	
6/7/1999	24.7	-1.8	4.8	-6.4	36.4	-1.7	12.4	-1.2	36.6	-3.8	36.2	Measurements collected immediately following system restart.
6/9/1999	26.7	-2.0	<0.1	-5.4	6.1	-2.0	<0.1	-4.5	4.7	-3.8	5.5	Intermittent operation 6-6 through 6-16.
6/11/1999	28.7	-1.8	<0.1	-3.5	11.3	-1.6	<0.1	-3.8	3.5	-3.8	6.7	Smaller replacement generator.
6/16/1999	34.0	-2.5	<0.1	-6.4	8.5	-2.6	<0.1	-4.9	4.4	-4.4	6.8	Hook-up to permanent electrical service.
6/21/1999	37.9	-2.5	<0.1	-6.2	5.2	-2.4	<0.1	-4.5	3.8	-4.0	4.6	
6/25/1999	40.7	-2.7	<0.1	-6.4	4.8	-2.2	<0.1	-5.0	2.7	-4.4	3.7	
7/2/1999	47.7	-2.5	<0.1	-6.1	3.3	-2.5	<0.1	-4.5	2.8	-4.5	2.8	
7/6/1999	51.9	-2.4	<0.1	-6.0	3.3	-2.6	<0.1	-4.4	3.1	-4.1	2.5	
7/9/1999	53.9	-2.5	<0.1	-6.5	3.5	-2.5	<0.1	-4.7	4.3	-4.2	3.8	
7/12/1999	56.7	-2.0	0.3	-2.0	4.5	-2.0	<0.1	-2.0	5.9	-2.0	3.8	
7/19/1999	63.9	-2.3	<0.1	-2.2	8.2	-2.2	<0.1	-2.5	5.8	-2.6	3.5	
7/27/1999	71.9	-2.2	<0.1	-2.1	9.2	-2.3	0.1	-2.3	6.0	-2.3	3.4	
8/3/1999	78.6	-2.3	0.2	-2.0	4.2	-2.0	<0.1	-2.0	4.8	-2.0	1.9	
8/10/1999	93.9	-2.2	1.0	-2.0	2.6	-2.0	<0.1	-2.0	4.4	-2.0	1.6	
8/17/1999	100.7	-2.2	0.9	-2.0	2.6	-2.0	<0.1	-2.2	3.8	-2.0	1.0	
8/25/1999	108.7	-2.2	0.7	-2.0	6.6	-2.3	<0.1	-2.2	5.9	-2.2	1.6	
9/1/1999	115.7	-2.3	1.6	-2.1	2.9	-2.3	<0.1	-2.3	5.0	-2.1	1.0	
9/7/1999	121.9	-2.2	2.6	-2.1	3.1	-2.2	0.1	-2.2	6.3	-2.2	1.4	
9/14/1999	128.7	-2.2	1.7	-2.1	1.4	-2.2	<0.1	-2.2	3.6	-2.2	0.8	
9/22/1999	136.9	-1.9	2.2	-1.7	1.7	-1.9	<0.1	-2.1	4.9	-2.1	0.7	
10/5/1999	150	-2.5	5.1	-3.4	6.8	-1.5	0.1	-3.7	6.5	-2.9	2.6	
10/19/1999	164	-2.4	2.7	-3.5	4.1	-1.7	0.1	-3.5	5.1	-2.5	2.0	
10/29/1999	173.7	-2.5	4.2	-3.5	5.5	-1.5	0.2	-3.5	6.6	-3.0	2.2	
11/18/1999	193.9	-2.0	0.2	-3.0	4.8	-1.0	0.1	-4.5	4.7	-3.5	2.4	
12/8/1999	214	-2.4	0.9	-3.0	5.8	-1.4	0.1	-3.9	4.9	-3.0	2.0	
1/11/2000	248.8	-3.2	<0.1	-3.8	3.7	-2.0	<0.1	-4.6	2.0	-3.8	0.4	

Table 3-10

Historical Extraction Trench Gas Monitoring Data

Geosyntec consultants

MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

DATE	TIME (days)	Location										COMMENTS
		RC-1		RC-2		RC-3		RC-4		RC-5		
		Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	
1/24/2000	261.6	-3	<0.1	-4.5	7.8	-2.5	0.2	-5.0	5.4	-3.5	2.0	
1/24/2000	261.7	-4.5	<0.1	-4.5	8.9	-2.0	0.2	-4.5	5.9	-5.0	2.0	
1/25/2000	262.7	-3.1	<0.1	-4.5	6.5	-2.0	0.2	-5.0	4.6	-3.5	1.7	
3/27/2000	324.4	-3.0	7.2	-3.8	3.8	1.8	0.3	-4.5	6.6	-3.4	3.0	
6/28/2000	419.3	0	--	-4.5	6.1	-2.2	3.3	-4.8	3.2	-3.4	1.3	Water in riser at RC-1
7/11/2000	432.8	0	--	-4.2	8.4	-1.5	<0.1	-1.3	4.2	-3.1	1.1	Water in riser at RC-1
7/18/2000	439.3	0	--	-3.8	0.9	-1.2	<0.1	-4.1	0.9	-2.5	0.3	Water in riser at RC-1
10/17/2000	530.6	0	--	-2.5	4.6	-1.0	0.1	-3.5	4.1	-2.0	0.9	Water in riser at RC-1
1/23/2001	628.9	-2.5	6.5	-3.5	2.2	-1.3	2.0	-4.0	5.2	-2.5	1.2	
4/24/2001	720.3	0.0	--	-4.0	6.1	-1.7	0.5	-4.8	3.6	-3.2	1.8	Water in riser at RC-1
7/19/2001	807	-1.6	1.1	-3.0	0.9	-0.8	2.7	-3.3	1.5	-2.0	<0.1	Water Pumped out of RC-1 on 7-18-01
10/23/2001	908.3	0.0	--	-4.0	10.7	-3.5	0.4	-5.0	6.8	-3.0	0.7	Water in riser at RC-1
11/27/2001	943.3	0.0	--	0.0	57.2	0.0	64.9	0.0	62.9	0.0	45.9	System Down for Repairs, Restarted at 12:40
1/24/2001	998.1	0.0	--	-1.0	1.7	-3.0	2.7	-4.5	1.0	-2.3	0.1	
4/18/2002	1082.3	0.0	--	-10.5	5.8	-3.5	6.9	-5.0	2.9	-3.5	1.7	
7/18/2002	1173.1	0.0	--	-8.2	0.9	-1.8	1.3	-3.2	2.0	-1.6	<0.1	
10/17/2002	1264.1	0.0	--	-8.0	2.8	-2.0	4.5	-3.8	1.7	-2.0	0.4	
1/16/2003	1345.1	-2.0	<0.1	-7.2	2.4	-2.0	3.9	-3.0	1.7	-2.0	<0.1	
4/24/2003	1443.1	-19.0	<0.1	-9.0	3.0	-2.5	5.1	-4.5	1.5	-2.0	0.3	
8/1/2003	1544.1	-6.0	2.5	-7.2	2.2	-2.5	4.5	-3.4	1.7	-3.0	<0.1	
10/21/2003	1623.1	-4.2	0.2	-6.8	0.5	-1.2	0.6	-2.4	0.5	-1.4	<0.1	
1/20/2004	1683.1	0.0	--	-9.0	2.7	-2.5	3.6	-4.0	1.0	-2.7	<0.1	
4/20/2004	1774.1	0.0	--	-9.0	3.2	-2.5	5.5	-4.0	2.0	-2.0	0.5	
10/26/2004	1963.1	-5.0	0.3	-5.0	1.5	-2.0	2.7	-3.0	0.5	-2.0	<0.1	
1/25/2005	2054.1	-9.0	<0.1	-10.0	4.3	-2.5	6.2	-2.6	1.9	-2.5	0.5	
4/13/2005	2131.1	-8.0	<0.1	-8.0	3.6	-2.5	5.1	-2.5	1.1	-2.5	<0.1	
7/21/2005	2330.1	-5.0	<0.1	-7.0	1.6	-1.5	<0.1	-3.0	2.0	-2.0	<0.1	
1/24/2006	2517.1	0.0	--	-7.4	3.2	-2.0	6.6	-2.5	3.0	-1.6	0.1	
4/20/2006	2603.3	-20.0	<0.1	-10.0	4.1	-4.5	4.0	-5.0	1.2	-4.0	<0.1	
7/19/2006	2692.2	-19.5	<0.1	-10.0	2.7	-2.0	4.4	-3.5	1.8	-2.0	<0.1	
10/27/2006	2792.2	-18	<0.1	-9.0	5.8	-2.5	4.5	-3.5	1.0	-2.0	<0.1	
1/18/2007	2874.2	-18	<0.1	-6.5	5.3	-2.0	6.5	-3.0	2.4	-2.0	2.0	
5/8/2008	3283	-15	<0.1	-14	6.2	-17	10.6	-21	1.0	-23	0.9	
7/30/2008	3366	-13.5	<0.1	-12	3.2	-15	4.6	0	1.5	na	na	
10/16/2008	3444	-11.5	<0.1	-10	2.1	-13	2.3	-14	1.0	-15	<0.1	
1/29/2009	3549	-8.5	<0.1	-8	1.9	-11	<0.1	-13	0.7	-15	0.8	
2/27/2009	3578	-8	<0.1	-10	4.9	-11	0.8	-14	<0.1	-17	<0.1	
4/29/2009	3639	-18	<0.1	-17	3.8	-18	2.4	-22	0.4	-25	0.7	
1/26/2010	3911	-17	<0.1	-15	<0.1	-16	<0.1	-20	<0.1	-21	<0.1	
5/28/2010	4033	0.01	22.8	0.3	55.7	0.0	27.3	0.0	25.4	0.0	15.9	
7/21/2010	4087	-12	0.2	-16	0.3	-13	0.2	-22	0.2	-22	0.1	

Table 3-10

Historical Extraction Trench Gas Monitoring Data

Geosyntec consultants

MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

DATE	TIME (days)	Location										COMMENTS
		RC-1		RC-2		RC-3		RC-4		RC-5		
		Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	Vacuum (inches H_2O)	Methane (%)	
10/27/2010	4185	-13	<0.1	-13	<0.1	-13	<0.1	-16	<0.1	-17	<0.1	
2/15/2011	4296	-16.5	<0.1	-15	<0.1	-13	0.1	-22	<0.1	-23	<0.1	
7/28/2011	4459	-15	<0.1	-19	<0.1	-12	<0.1	-12	<0.1	-20	<0.1	
10/25/2011	4548	-11	<0.1	-3	<0.1	-11	2.4	-14	2.1	-16	<0.1	
2/2/2012	4648	-12	<0.1	-10	<0.1	-12	0.7	-15	<0.1	-18	<0.1	
4/20/2012	4726	-14	0.1	-13	1.2	-15	1.2	-19	0.1	-20	0.2	
7/12/2012	4809	-13	<0.1	-13	2.1	-14	0.9	-17	1.2	-2	0.2	
10/18/2012	4907	-2	0.1	-2	3.1	-3	0.5	-5	0.9	-5	<0.1	
1/28/2013	5009	-4	<0.1	-4	2.7	-5	1.0	-9	0.8	-10	0.1	
4/16/2013	5087	-10	<0.1	-10	1.6	-11	0.4	-15	0.2	-16	0.2	
7/22/2013	5184	0.0	0.2	-4	4.0	-8	1.8	-10	2.1	-11	0.4	
10/22/2013	5276	-4	<0.1	-5	2.9	-5	0.5	-6	0.8	-8	<0.1	
3/13/2014	5418	NM	NM	NM	NM	0.02	43.8	NM	NM	0.02	13.4	Could not measure concentrations at RC-1 , RC-2, or RC-4 due to ice. The blower was not functioning properly and is being replaced in April 2014.

Note: Data through 2007 obtained by Bureau Veritas, LLC (aka Clayton Group Services, Inc)

Red values indicate exceedance of 50% of Methane Lower Explosive Limit (LEL) of 5% methane.

Table 3-11
Historical Blower Gas Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Date	Time (days)	Vacuum (inches H_2O)	Methane (%)	Flow Rate (ft^3/min)	Comments
5/12/1999	Pre-Startup	0.0	--	0.0	System completed, flare lit in passive mode
5/13/1999	0	Gas Extraction System Startup			System blower started at 1500 hours with generator power
5/13/1999	0.1	-24	21.3	n/m	flare flame continues burning
5/14/1999	0.9	-24	9.1	n/m	flare flame has become extinguished
5/15/1999	1.9	-23	8.4	n/m	
5/16/1999	2.9	-23	7.9	n/m	
5/17/1999	3.8	-23	7.1	n/m	
5/18/1999	4.9	-25	7.2	1,900	Flow measurements collected via Hot Wire Animomiter
5/19/1999	6.0	-28	8.3	n/m	
5/20/1999	6.7	-28	6.5	n/m	
5/21/1999	7.7	-27	6.5	1,700	
5/24/1999	10.9	-28	4.7	n/m	
5/26/1999	12.7	-28	3.1	n/m	
5/27/1999	14.0	-28	3.7	n/m	
6/1/1999	18.7	-28	3.8	1,700	
6/3/1999	20.7	-28	2.7	1,400	
6/7/1999	24.7	-26	35.2	2,200	Measurements collected immediately following system restart
6/9/1999	26.7	-25	3.8	n/m	Intermittent operation 6-6 through 6-16
6/11/1999	28.7	-14	4.8	n/m	Smaller replacement generator
6/16/1999	34.0	-27	4.3	n/m	Hook-up to permanent electrical service
6/21/1999	37.9	-27	2.9	n/m	
6/25/1999	40.7	-27	2.5	n/m	
7/2/1999	47.7	-27	1.9	n/m	
7/6/1999	51.9	-27	1.9	n/m	
7/9/1999	53.9	-27	2.5	n/m	
7/12/1999	56.7	-31	2.4	n/m	
7/19/1999	63.9	-31	2.9	n/m	
7/27/1999	71.9	-31	3.0	n/m	

Table 3-11
Historical Blower Gas Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Date	Time (days)	Vacuum (inches H_2O)	Methane (%)	Flow Rate (ft^3/min)	Comments
8/3/1999	78.6	-31	1.8	n/m	
8/10/1999	93.9	-30	1.5	n/m	
8/17/1999	100.7	-31	1.3	n/m	
8/25/1999	108.7	-31	2.4	n/m	
9/1/1999	115.7	-31	1.7	n/m	
9/7/1999	121.9	-30	2.2	n/m	
9/14/1999	128.7	-30	1.1	n/m	
9/22/1999	136.9	-29	1.4	n/m	
10/5/1999	150	-31	3.7	n/m	
10/19/1999	164	-30	2.5	n/m	
10/29/1999	173.7	-31	2.4	n/m	
11/18/1999	193.9	-31	2.3	n/m	
12/8/1999	214	-30	2.6	n/m	
1/11/2000	248.8	-30	1.0	n/m	
1/24/2000	261.6	-31	3.9	n/m	
1/24/2000	261.7	-31	3.9	n/m	
1/25/2000	262.7	-31	3.0	n/m	
3/27/2000	324.4	-31	5.1	n/m	
6/28/2000	419.3	-31	3.4	n/m	
7/18/2000	439.3	-31	0.3	n/m	
10/17/2000	495.5	-31	2.9	n/m	
1/23/2001	629.0	-31	2.8	n/m	
4/24/2001	720.3	-31	1.2	n/m	
7/19/2001	807	-31	1.2	n/m	
10/23/2001	908.3	-31	5.6	n/m	

Table 3-11
Historical Blower Gas Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Date	Time (days)	Vacuum (inches H_2O)	Methane (%)	Flow Rate (ft^3/min)	Comments
1/24/2002	998.1	-30	1.8	n/m	
4/18/2002	1082.3	-31	64.0	n/m	
7/18/2002	1173.1	-31	10.0	n/m	
10/17/2002	1264.1	-27	1.0	n/m	
1/16/2003	1345..1	-31	0.4	n/m	
4/24/2003	1443.1	-31	0.0	n/m	
8/1/2003	15441	-28	0.0	n/m	
10/21/2003	1623.1	-27	0.3	n/m	
1/20/2004	1683.1	-31	1.5	n/m	
4/20/2004	1774.1	-30	2.7	n/m	
10/26/2004	1963.1	-28	0.6	n/m	
1/25/2005	2054.1	-30	2.5	n/m	
4/13/2005	2131.1	-30	2.2	n/m	
7/21/2005	2330.1	-30	0.0	n/m	
10/20/2005	2421.1	0	n/m	n/m	Blower failure
1/24/2006	2517.1	-27	3.1	n/m	New Blower Installed 12-20-05
4/20/2006	2603.3	-30	0.7	n/m	
7/19/2006	2692.2	-30	2.0	n/m	
10/27/2006	2792.2	-28	3.3	n/m	
1/18/2007	2874.2	-25	3.8	n/m	
5/8/2008	3283	-25	1.8	n/m	
7/30/2008	3366	na	na	na	Not accessible
10/16/2008	3444	-16	1.4	n/m	
1/29/2009	3549	-15	2.3	n/m	
2/27/2009	3578	-19	1.7	n/m	
4/29/2009	3639	-27	1.8	n/m	

Table 3-11
Historical Blower Gas Monitoring Data
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

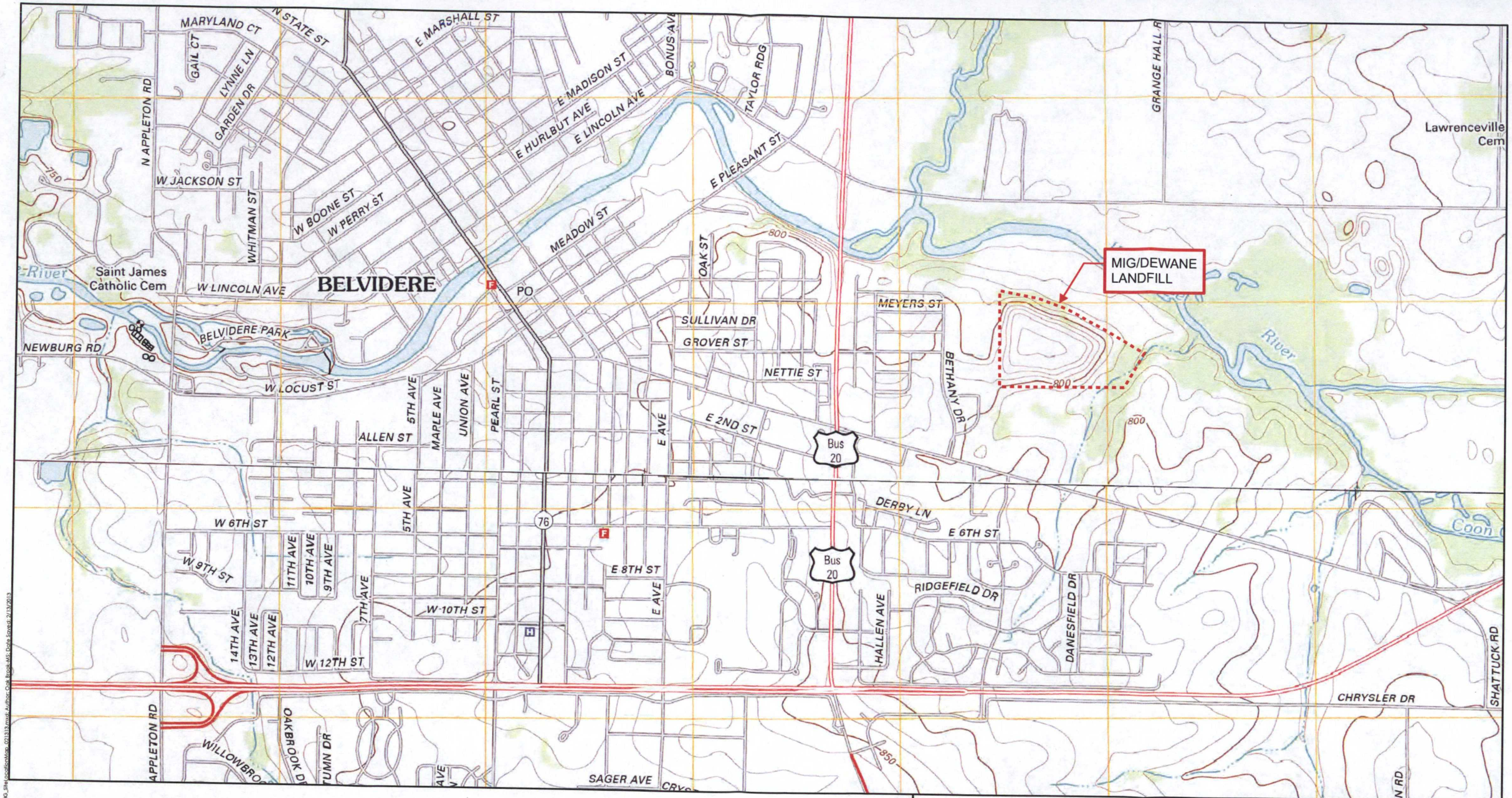
Geosyntec consultants

Date	Time (days)	Vacuum (inches H_2O)	Methane (%)	Flow Rate (ft^3/min)	Comments
1/26/2010	3911	-25	0.5	n/m	
5/28/2010	4033	0.02	37.6	n/m	
7/21/2010	4087	-24	<0.1	n/m	
10/27/2010	4185	-18	0.2	n/m	
2/15/2011	4296	-25	1.1	n/m	
7/28/2011	4459	-20	<0.1	n/m	
10/25/2011	4548	-17	2.0	n/m	
2/2/2012	4648	-19	0.7	n/m	
4/20/2012	4726	0.5	0.1	n/m	
7/12/2012	4809	-11	1.1	n/m	
10/18/2012	4907	-5	0.7	n/m	
1/28/2013	5009	-11	0.5	n/m	
4/16/2013	5087	-17	0.6	n/m	
7/22/2013	5184	-11	1.1	n/m	
10/22/2013	5276	-9	0.7	n/m	
3/13/2014	5418	0.01	33.2	n/m	The blower was not functioning properly and is being replaced in April 2014.

Note: Data prior to 2007 obtained by Bureau Veritas, LLS (aka Clayton Group Services, Inc)

Red values indicate exceedance of 50% of Methane Lower Explosive Limit (LEL) of 5% methane.

FIGURES



800 400 0 800 Feet

Site Location
MIG/DeWane Landfill

Belvidere, IL

Basemap Source: USGS 7.5 minute quadrangele maps Belvidere North and Belvidere South

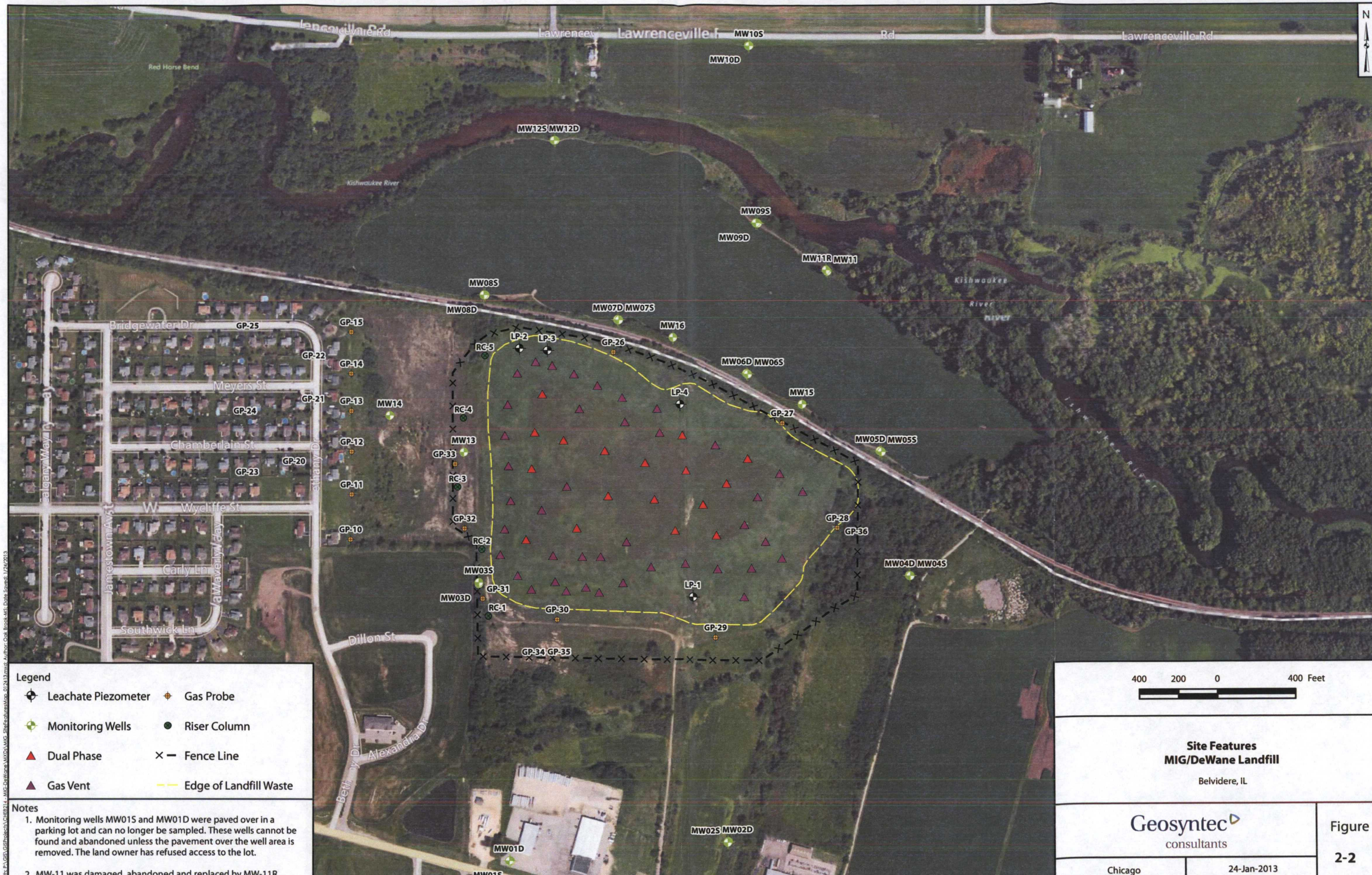
Geosyntec consultants

Chicago

13-Feb-2013

Figure

2-1



Legend

- Leachate Piezometer
- Gas Probe
- Monitoring Wells
- Riser Column
- Dual Phase
- Fence Line
- Gas Vent
- Edge of Landfill Waste

Notes

1. Monitoring wells MW01S and MW01D were paved over in a parking lot and can no longer be sampled. These wells cannot be found and abandoned unless the pavement over the well area is removed. The land owner has refused access to the lot.
2. MW-11 was damaged, abandoned and replaced by MW-11R.

Site Features
MIG/DeWane Landfill

Belvidere, IL

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Chicago | 24-Jan-2013

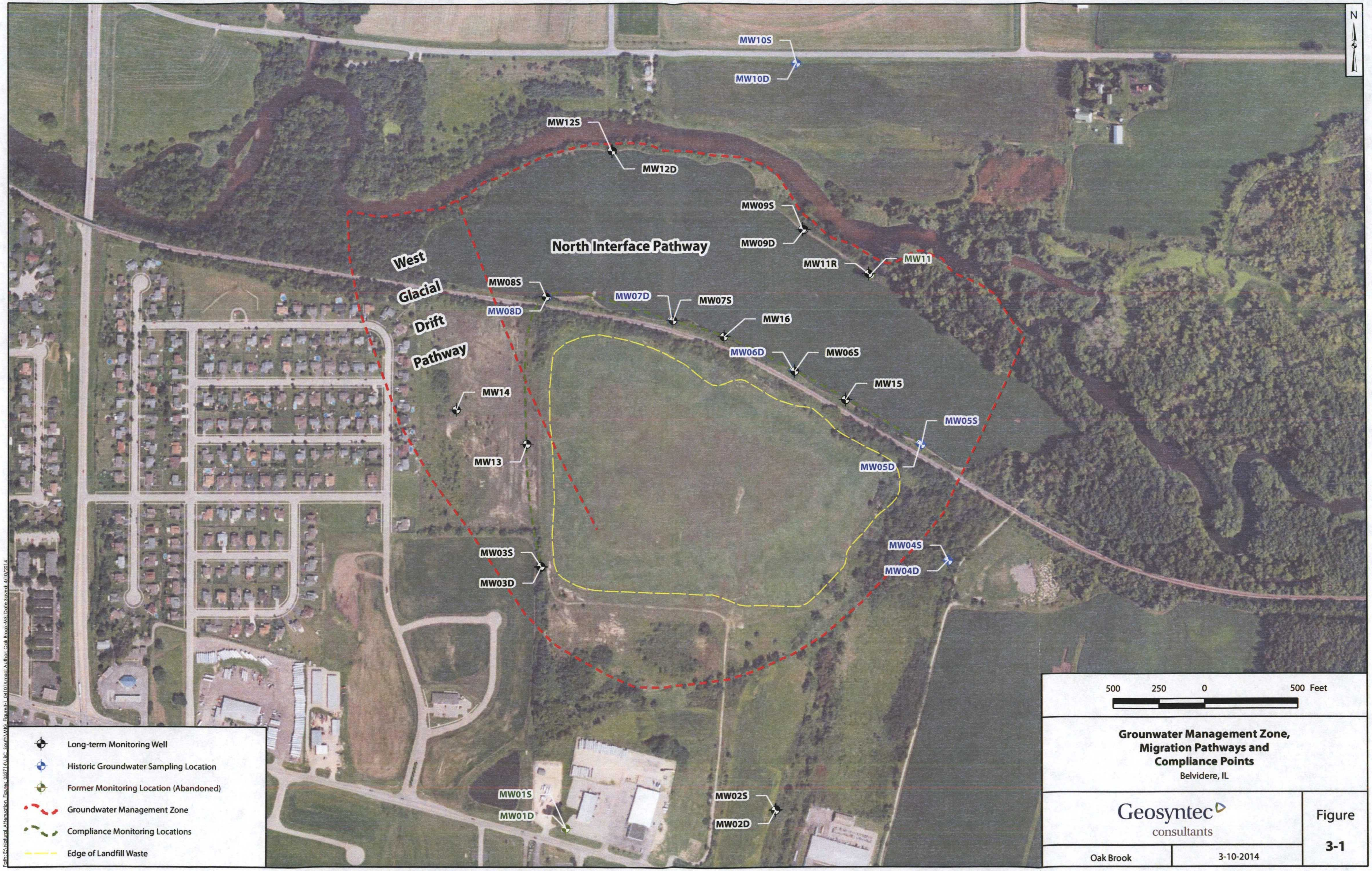
Figure 2-2

Geosyntec Consultants
Chicago, Illinois

FIGURE 2-3
PROJECT TIMELINE
Showing Landfill Ownership, Regulatory Authorizaton, Landfill Operations, Post Landfill Operation Events, RI/FFS and RD Activities
MIG/DeWane Landfill / Belvidere, Illinois

STATUS / LANDFILL ACTIVITY		TIME PERIOD (1968–2014)
Landfill Ownership	Mr. R.E. DeWane, Ms. J.A. Farina, and Mr. J.L. DeWane	1968 —> August 22, 1983
	United Bank & Trust - #2364 for L.A.E., Inc.	August 22, 1983 —> May 6, 1988
	First National Bank of Rockford (NKA First of America Trust Company) - #6681 for L.A.E., Inc.	May 6, 1988 —> April 15, 1991
	L.A.E., Inc. (1)	April 15, 1991 —> Present
IDPH Registration	Mr. J. Kennedy/Boone Landfill, Inc.	February 7, 1969
IEPA Permit	National Disposal Service, Inc. (AKA - Browning-Ferris Industries of Illinois)	May 5, 1972
IEPA Supplemental Permit	Transfer Operating Permit to M.I.G. Investments, Inc.	October 9, 1975
Landfill Operation	Mr. J. Kennedy	February 7, 1969 —> July 31, 1969
	Boone Landfill, Inc.	July 31, 1969 —> January 21, 1970
	Boone Disposal Company	January 21, 1970 —> March 1971
	Browning-Ferris Industries of Illinois	March 1971 —> October 15, 1975
	M.I.G. Investments, Inc.	October 15, 1975 —> June 30, 1988
USEPA Site Inspection		June 27, 1984
USEPA Evaluation (HRS Scoring)		November 20, 1986
USEPA Placement of Landfill on National Priorities List		August 30, 1990
IRM Activities		1991 through 1993
RI/FS Activities		1993 —> 1999
IEPA Final Report Human Health and Ecological Risk Assessment		1997
RI Report		July - September 5, 1997
FFS Report		February 1, 1999
Gas Remediation		
Gas Extraction System West of Site		March - May 1999
Gas monitoring systems in Wycliffe Estates		May - June 1999
Groundwater / Soil-Gas Sampling Report		February- July 2000
Regulatory Decision Making		
Record of Decision		March 31, 2000
Consent Decree		March 13, 2006
Remedial Design Activities		
Interim Groundwater Sampling		December 2010 - Present
30% Design		April 2006 - April 2007
Alternative Cover Landfill Cover Evaluation		July 2006 - January 2007
95% Design		Nov 2013 - April 2014
Explanation of Significant Differences (ESD)		Feb 2012 - August 2013
Remedial Actions		
Gas Well and Vent Work Plan		June 2008 - September 2008
Gas Well and Vent Construction		Nov 2008 - January 2010

NOTES:
(1) The sole shareholders of L.A.E. are Raymond E. DeWane and Jean A. Farina.
(2) The information from this table through 1997 came from Clayton Environmental Consultants FFS (February 1999)
(3) The information after 1997 came from various post FFS documments.



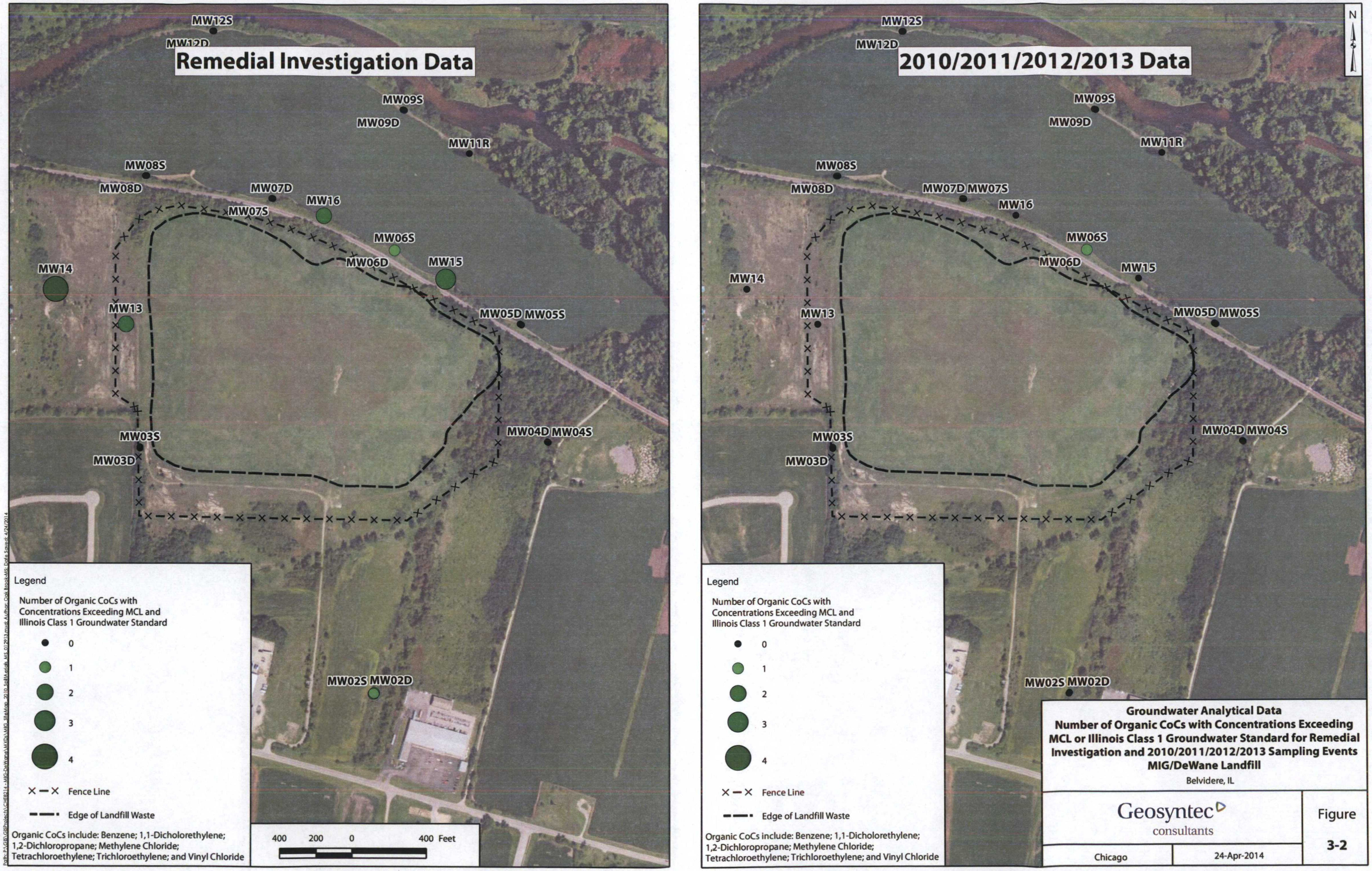
Grounwater Management Zone, Migration Pathways and Compliance Points

Belvidere, IL

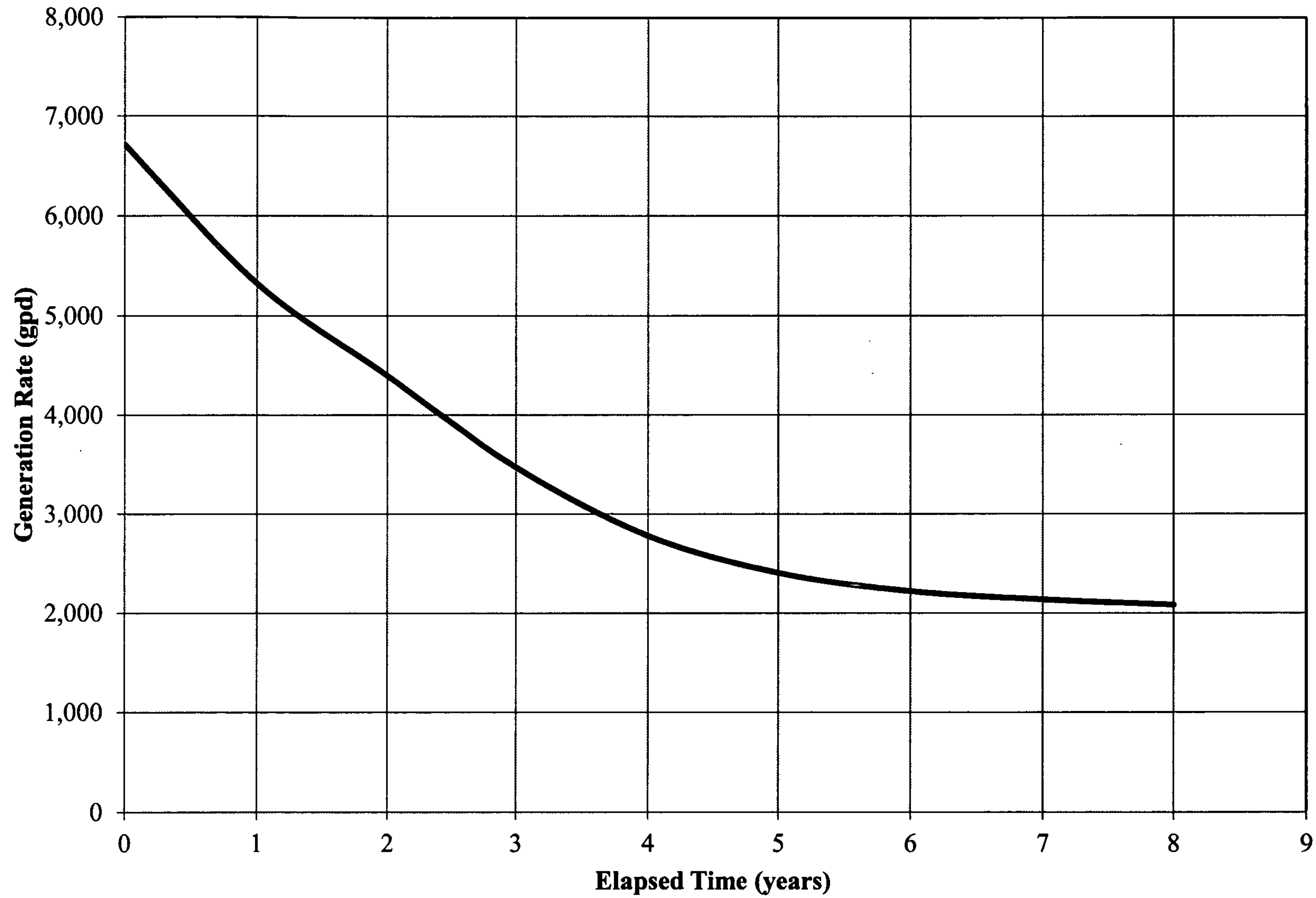
Geosyntec consultants

Oak Brook | 3-10-2014

Figure 3-1

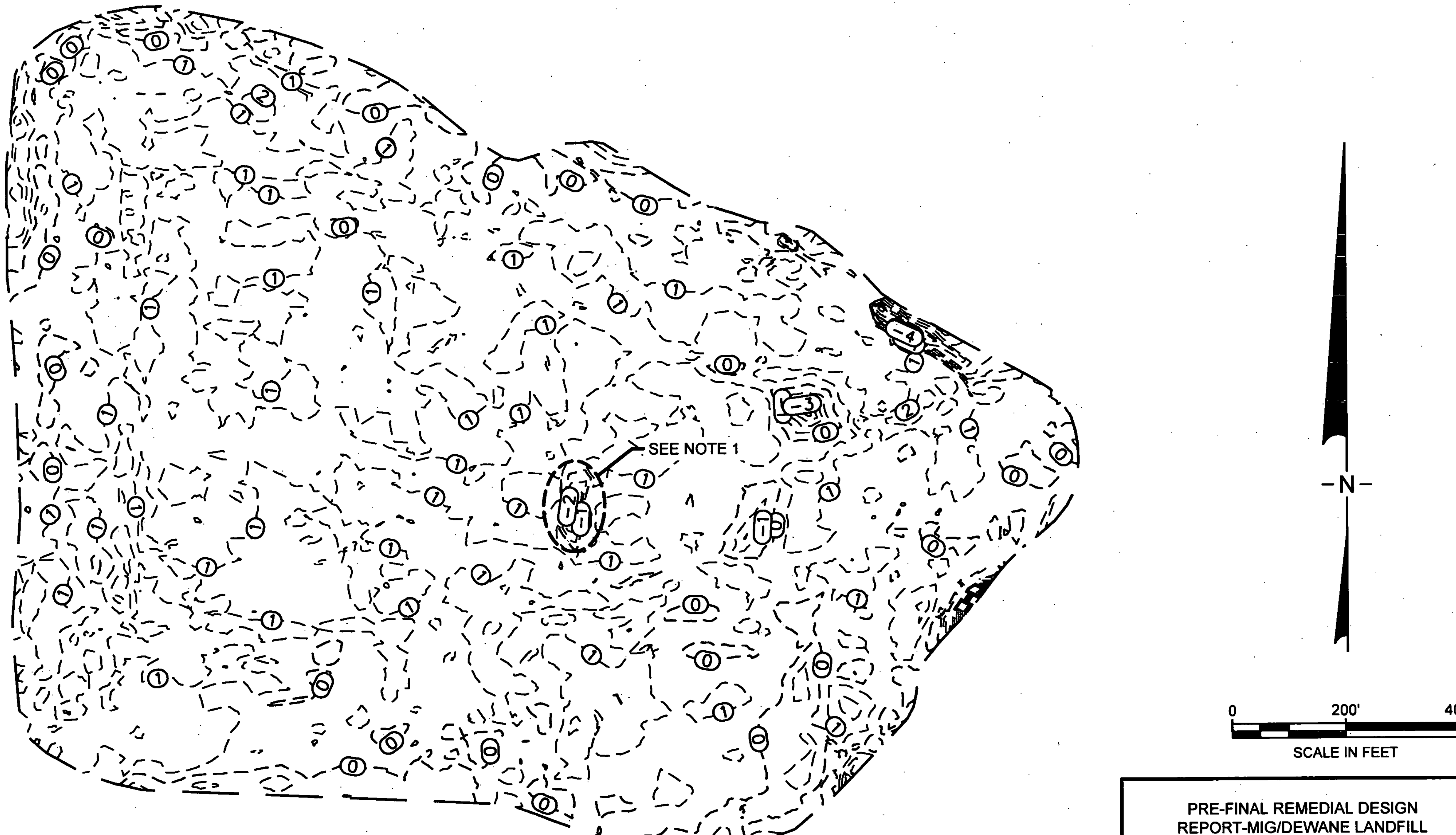


Remedial Investigation Data
2010/2011/2012/2013 Data
N
MW12S
MW12D
MW09S
MW09D
MW11R
MW08S
MW08D
MW07D
MW07S
MW16
MW06S
MW06D
MW15
MW14
MW13
MW05D MW05S
MW04D MW04S
MW03S
MW03D
MW02S MW02D
Legend
Number of Organic CoCs with Concentrations Exceeding MCL and Illinois Class 1 Groundwater Standard
0
1
2
3
4
Fence Line
Edge of Landfill Waste
Organic CoCs include: Benzene; 1,1-Dicholorethylene; 1,2-Dichloropropane; Methylene Chloride; Tetrachloroethylene; Trichloroethylene; and Vinyl Chloride
400 200 0 400 Feet
Groundwater Analytical Data
Number of Organic CoCs with Concentrations Exceeding MCL or Illinois Class 1 Groundwater Standard for Remedial Investigation and 2010/2011/2012/2013 Sampling Events
MIG/DeWane Landfill
Belvidere, IL
Geosyntec consultants
Figure
3-2
Chicago
24-Apr-2014



Estimated Post Closure Leachate Generation Rate

Remedial Design Report MIG/Dewane Landfill April 2014	Geosyntec consultants	Figure 3-3



NOTES:

1. ISOPACHS WERE CREATED BY COMPARING 2006 SURVEY RESULTS TO 2014 SURVEY RESULTS. POSITIVE NUMBERS INDICATE AMOUNT OF SETTLEMENT. NEGATIVE NUMBERS IN THE AREA BOUNDED BY DASHED LINE ARE DUE TO PLACEMENT OF ADDITIONAL MATERIAL IN THE LANDFILL DURING GAS VENT INSTALLATION IN 2008. OTHER NEGATIVE NUMBERS ARE DUE TO DISCREPANCIES BETWEEN TWO SURVEY DATA.

PRE-FINAL REMEDIAL DESIGN REPORT-MIG/DEWANE LANDFILL SUPERFUND SITE

Geosyntec consultants

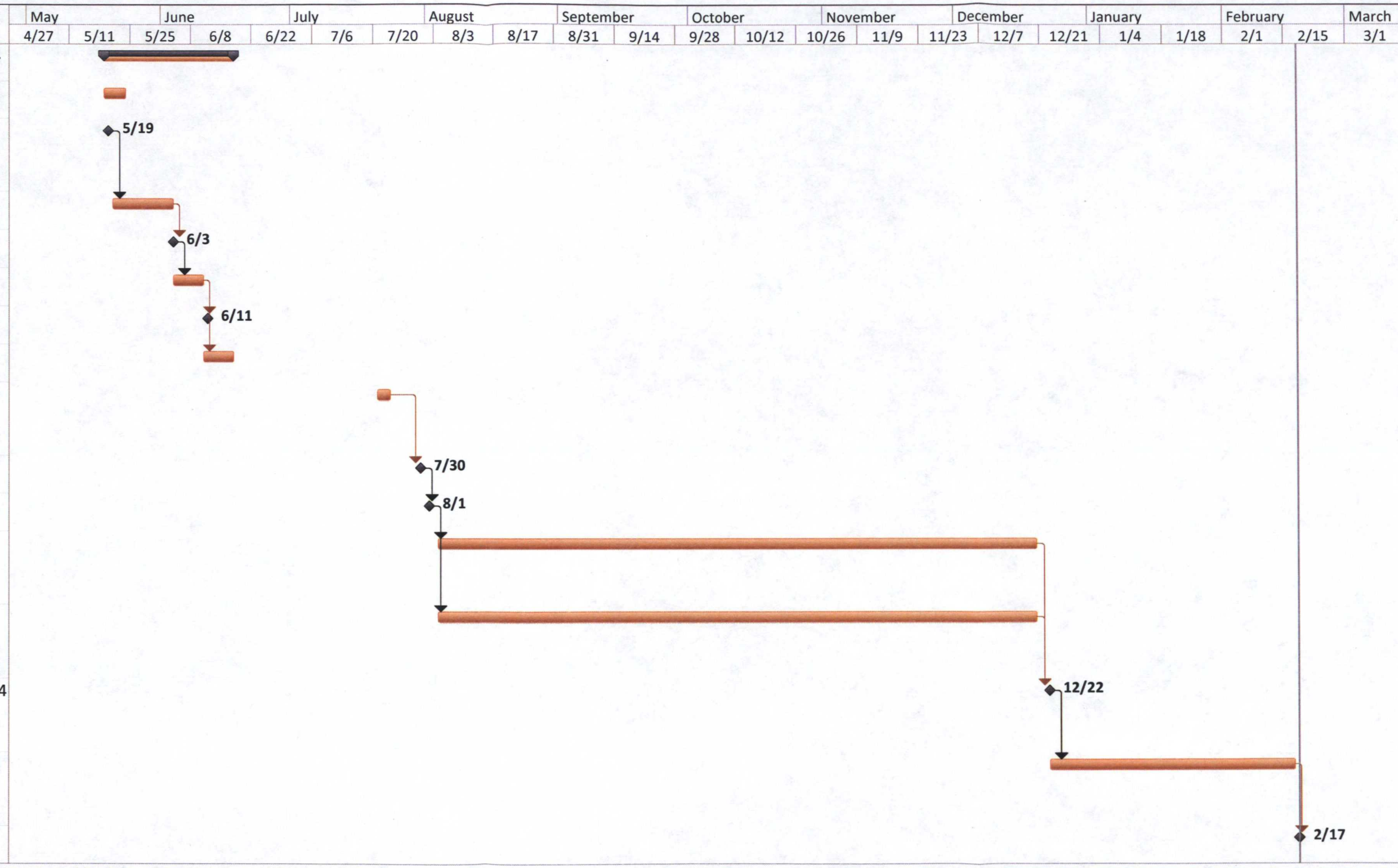
FIGURE 3-4

PROJECT NO: CHE8214 | APRIL 2014

H:\LAND PROJECTS 2014\CHE8214\FIGURES\REPORT\8214-F003

Figure 7-1
Geosyntec Consultants
MIG DeWane Landfill, Belvidere, IL
Prelimianry Remedial Construction Schedule

ID	Task Name	Duration	Start
1	**Bidding**	**22 days**	**Mon 5/19/14**
2	**Bid Documents**	5 days	Mon 5/19/14
3	Bid Documents sent to prospective bidders	1 day	Mon 5/19/14
4	Bid Preparation	10 days	Wed 5/21/14
5	Bids Due	1 day	Tue 6/3/14
6	Review Bids	5 days	Wed 6/4/14
7	Select Contractor	1 day	Wed 6/11/14
8	Contractor Negotiations	5 days	Wed 6/11/14
9	**Revise Bid Documents based on IEPA Review**	3 days	Mon 7/21/14
10	IEPA Final Approval	5 days	Thu 7/24/14
11	**Begin Construction**	1 day	Fri 8/1/14
12	Remedial Action Construction	100 days	Mon 8/4/14
13	Field Construction Quality Assurance	100 days	Mon 8/4/14
14	Construction Complete and Final Inspection	1 day	Mon 12/22/14
15	**Construction Completion Report**	40 days	Tue 12/23/14
16	Project Complete	1 day	Tue 2/17/15



Project: 2014-01-15-MIG-DeWane
Date: Mon 4/14/14

Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
Split		External Tasks		Inactive Summary		Manual Summary		Progress	
Milestone		External Milestone		Manual Task		Start-only			
Summary		Inactive Task		Duration-only		Finish-only			

Geosyntec Consultants
April 2014

APPENDIX A

Design Drawings

APPENDIX B

Specifications

APPENDIX C

Pre-Design Investigation and Additional Data Summary Tables

Table C-1
Gas Readings at Cover Borings
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Drilling ID	Well #	Date	Location	CH_4 (%)	CO (%)	O_2 (%)	Notes
CB-1		11/13/06	East Slope LF	2.4	0.1	20.8	
CB-2		11/13/06	East Slope LF	2.1	0.1	20.8	
CB-3		11/13/06	East Slope LF	0.2	0.2	20.8	
CB-4		11/13/06	South Slope LF	0.4	0.1	20.8	
CB-5		11/13/06	South Slope LF	1.1	0.1	20.8	
CB-6		11/13/06	South Slope LF	0.2	0.2	20.9	
CB-7		11/13/06	South Slope LF	3.0	0.2	20.9	
CB-8		11/13/06	South Slope LF	1.1	0.2	21.0	
CB-9		11/13/06	South Slope LF	0.5	0.1	21.0	
CB-10		11/13/06	South Slope LF	1.0	0.1	20.9	
CB-11		11/13/06	South Slope LF	2.6	0.2	20.8	
CB-12		11/13/06	East Top LF	3.0	0.2	20.8	
CB-13		11/13/06	Center Top LF	3.4	0.2	20.9	
CB-14		11/13/06	West Top LF	1.2	0.2	20.8	
CB-15		11/13/06	West Top LF	0.3	0.2	20.9	
CB-16		11/13/06	West Slope LF	0.9	0.1	20.8	
CB-17		11/13/06	West Slope LF	0.8	0.1	20.8	
CB-18		11/13/06	West Slope LF	1.0	0.1	20.8	
CB-19		11/15/06	NW Slope LF	4.5	0.1	20.8	
CB-20		11/15/06	North Slope LF	3.9	0.1	20.8	
CB-21		11/15/06	North Slope LF	4.0	0.1	20.8	
CB-22		11/15/06	North Slope LF	0.1	0.1	20.8	
CB-23		11/15/06	North Slope LF	2.1	0.3	21.1	
CB-24		11/15/06	NE Slope LF	2.0	0.1	20.8	
GB-01		11/15/06	N outside LF	2.1	0.2	20.8	No waste encountered
GB-01A		11/15/06	N inside LF	2.1	0.2	20.8	
GB-02		11/15/06	N outside LF	2.5	0.1	20.9	No waste encountered
GB-02A		11/15/06	N inside LF	2.5	0.1	20.9	
GB-03		11/15/06	N outside LF	3.1	0.1	20.8	No waste encountered
GB-03A		11/15/06	N inside LF	3.1	0.1	20.8	
LPB-01	LP-1	11/15/06	South Slope LF	8.0	0.2	20.6	
LPB-02	LP-2	11/14/06	North Slope LF	6.0	0.1	20.8	
LPB-03	LP-3	11/14/06	North Slope LF	5.1	0.1	20.9	
LPB-04	LP-4	11/14/06	North Slope LF	4.5	0.2	20.6	
GPB-01	GP-28	11/16/06	N outside LF	1.0	0.2	20.9	No waste encountered
GPB-02	GP-29	11/16/06	N outside LF	4.0	0.2	21.0	No waste encountered
GPB-03	GP-30	11/16/06	E outside LF	6.2	0.2	20.9	No waste encountered
GPB-04	GP-31	11/16/06	S outside LF	0.1	0.1	21.1	No waste encountered
GPB-05	GP-32	11/16/06	S outside LF	3.3	0.1	20.9	No waste encountered
GPB-06	GP-33	11/16/06	SW outside LF	0.1	0.1	20.9	No waste encountered
GPB-07	GP-26	12/07/06	W outside LF	0.1	0.2	21.0	No waste encountered
GPB-08	GP-27	12/07/06	W outside LF	0.1	0.1	21.0	No waste encountered

Notes:
1. Methane readings were taken directly above borehole for highest concentration.
2. MiniRae and Landtec GEM 500 monitoring devices were used to monitor air.

Definittions:

CB: Cover Boring
LPB: Leachate Piezometer Boring
GPB: Gas Probe Boring
GB: Edge of Waste Geoprobe Boring

Table C-2
Soil Testing Summary
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Sample ID	Sample Location	Depth (ft)	Weight (lbs)	USCS Classification	% M	% Pass 3/4"	% Pass 3/8"	Fines <#200(%)	Specific Gravity	Atterberg Limits		
										LL	PL	PI
Cap #1	Top (GP-6)	1-3	42	CL-Sandy lean clay	12.8	100	99	66.8	2.72	33	16	17
Cap #2	Top (GP-6)	1-3	39	CL-Sandy lean clay	12.3	100	98	68.5	2.72	31	15	16
Cap #3	Top (GP-6)	1-3	36	CL-Sandy lean clay	11.8	96	88	58.0	2.72	29	14	15
Cap #4	Top (CB-18)	1-3	37	CL-Sandy lean clay	13.1	92	92	60.6	2.72	32	14	18
Cap #5	Top (CB-18)	1-3	38	CL-Sandy lean clay	12.6	100	97	65.7	2.72	31	14	17
W. Borrow #1	Field	2-3	34	CL-Sandy lean clay	12.2	93	92	60.5	2.73	31	14	17
W. Borrow #2	Field	2-3	35	CL-Sandy lean clay	10.9	90	90	61.6	2.73	30	13	17
W. Borrow #3	Field	2-3	36	CL-Sandy lean clay	12.5	100	100	66.5	2.73	31	15	16
W. Borrow #4	Field	2-3	35	CL-Sandy lean clay	10.3	100	96	64.4	2.73	31	13	18
W. Borrow #5	Field	2-3	35	CL-Sandy lean clay	10.5	100	98	65.4	2.73	31	14	17
S. Borrow #1	SW corner	5-10	21	CL-Sandy lean clay	17.7	100	92	67.4	2.75	31	16	15
S. Borrow #2	SW corner	2-3	37	CL-Sandy lean clay	11.5	100	98	66.6	2.75	30	14	16
S. Borrow #3	N end (low)	2-12	19	SC - Clayey sand	14.5	100	98	37.7	2.75	22	13	9
S. Borrow #4	N end (high)	3-12	21	CL - Sandy lean clay	13.9	96	93	58.1	2.75	27	14	13
S. Borrow #5	S end (high)	3-12	21	CL - Sandy lean clay	12.3	100	91	50.6	2.75	35	17	18
S. Borrow #6	S end (low)	2-10	20	SC - Clayey sand w/gravel	12.9	90	93	25.9	2.75	24	17	7

Notes:
1. 3 sources were collected - W. Borrow, S. Borrow and the Cap.
2. S. Borrow samples #3 & #6 were composited for testing and contained both clay and sand.

Table C-3
Summary of Most Recent Gas Probe Readings
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Monitoring[1] Points	Date	Barometric Pressure (inches Hg)	Vacuum (inches H_2O)	LEL (%)	Methane[2] (%)	Carbon Dioxide (%)	Oxygen (%)
GP-10	03/13/14	-	0.00	-	0.2	-	-
GP-11	03/13/14	-	0.00	-	0.2	-	-
GP-12	03/13/14	-	0.00	-	0.2	-	-
GP-13	03/13/14	-	0.00	-	0.2	-	-
GP-14	03/13/14	-	0.00	-	0.2	-	-
GP-15	03/13/14	-	0.00	-	0.2	-	-
GP-20	03/13/14	-	0.00	-	0.2	-	-
GP-21	03/13/14	-	(1)	-	(1)	-	-
GP-22	03/13/14	-	0.00	-	0.2	-	-
GP-23	03/13/14	-	(1)	-	(1)	-	-
GP-24	03/13/14	-	(1)	-	(1)	-	-
GP-25	03/13/14	-	(1)	-	(1)	-	-
GP-26	03/13/14	30.0	0.00	<0.1	<0.1	0.1	22.5
GP-27	03/13/14	30.0	0.00	2	0.1	0.1	22.5
GP-28	03/13/14	30.0	0.00	-	73.5	26.4	0.0
GP-29	03/13/14	30.0	0.00	<0.1	<0.1	0.1	22.8
GP-30	03/13/14	30.0	0.00	28	1.4	0.6	21.4
GP-31	03/13/14	30.0	0.00	64	3.20	3.8	14.8
GP-32	03/13/14	30.0	0.00	<0.1	<0.1	0.1	22.1
GP-33	03/13/14	30.0	0.00	6	0.3	0.9	19.8
GP-34	03/13/14	30.0	0.00	<0.1	<0.1	0.2	22.0
GP-35	03/13/14	30.0	0.00	<0.1	<0.1	0.2	21.6
GP-36	03/13/14	30.0	0.00	2	0.1	0.5	22.0
GP-37	03/13/14	30.0	0.00	<0.1	<0.1	0.3	22.2
MW-13	03/13/14	30.0	-0.05	-	68.9	31.0	0.0
MW-14	03/13/14		0.00		0.2		

Note 1: The monitoring point could not be located due to snow cover.

Table C-4
Groundwater Elevations
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Sampling Point	Feature Location	Top of Casing Elevation (MSL)	Ground Surface (MSL)	Depth of Boring (ft below surface)	Depth to Water (From TOC)	Elevation of Water (ft)
Monitoring Well[1]						
MW02S	Upgradient	786.84	785.06	15.5	2.2	784.64
MW02D	Upgradient	787.21	784.82	37.0	0.42	786.79
MW03S	West Site Boundary	813.51	811.32	40.0	31.83	781.68
MW03D	West Site Boundary	813.67	810.99	79.6	32.1	781.57
MW04S	Side-Gradient	788.80	776.24	10.5	5.6	783.20
MW04D	Side-Gradient	788.62	775.99	30.0	7.2	781.42
MW05S	Side-Gradient	780.29	776.96	30.7	15.1	765.19
MW05D	Side-Gradient	780.10	777.26	51.0	14.96	765.14
MW06S	Downgradient Site Boundary	781.66	779.49	35.6	14.43	767.23
MW06D	Downgradient Site Boundary	782.22	779.49	54.6	(2)	(2)
MW07S	Downgradient Site Boundary	780.05	777.88	35.0	15	765.05
MW07D	Downgradient Site Boundary	779.88	778.03	55.0	17.29	762.59
MW08S	Downgradient Site Boundary	782.40	779.08	44.6	21.05	761.35
MW08D	Downgradient Site Boundary	781.20	779.03	65.0	19.65	761.55
MW09S	Kishwukee River Sentinel Well	774.20	771.60	31.0	20.28	753.92
MW09D	Kishwukee River Sentinel Well	774.29	771.74	61.0	20.25	754.04
MW10S	North of Kiswaukee River	761.69	759.35	16.7	6.52	755.17
MW10D	North of Kiswaukee River	761.64	759.29	78.0	5.38	756.26
MW11R	Kishwukee River Sentinel Well	761.23	768.33	18.9	16	745.23
MW12S	Kishwukee River Sentinel Well	761.40	758.70	14.9	8.55	752.85
MW12D	Kishwukee River Sentinel Well	761.23	758.70	77.0	5.25	755.98
MW13	West Site Boundary	795.70	793.30	21.8	19.76	775.94
MW14	West Site Boundary	795.80	797.96	30.9	24	771.80
MW15	Downgradient Site Boundary	783.12	781.00	23.2	15.18	767.94
MW16	Downgradient Site Boundary	777.37	774.90	19.7	10.72	766.65

Notes:
1. Monitoring wells were used for groundwater levels from July 2013.
2. MW06D well cover could not be opened in July 2013.

Table C-5
Leachate Piezometer Development Summary
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Geosyntec consultants

Well ID	Development Date	Depth to Leachate[1] (ft)	Depth to Bottom of Casing[1] (ft)	Well Volume (gal)	Total Purged Volume (gal)
LP-01	11/27/2006	2.50	10.10	1.24	16
LP-02	11/27/2006	7.82	15.09	1.19	20
LP-03	11/27/2006	5.72	10.10	0.71	22
LP-04	11/28/2006	8.34	10.11	0.29	3.5

Notes:

1. Measured from top of well casing.

Table C-6
Leachate Hydraulic Conductivity Test Summary
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinios

Geosyntec consultants

Well Identification	Test Date	Test Number	Hydraulic Conductivity (cm/sec)	Average Hydraulic Conductivity (cm/sec)
LP-01	11/28/2006	1	1.5E-03	1.4E-03
		2	1.2E-03	
LP-02	11/28/2006	1	5.3E-04	5.1E-04
		2	NA	
		3	4.9E-04	
LP-03	11/28/2006	1	NA	NA
		2	NA	
LP-04	11/28/2006	1	3.9E-03	4.4E-03
		2	4.9E-03	

Notes:
1. NA - Hydraulic conductivity could not be accurately calculated from the field data.

APPENDIX D

Leachate Generation Calculations

Geosyntec consultants

COMPUTATION COVER SHEET

Client: BFINA	Project: MIG/DeWane Landfill	Project/ Proposal No.:	CHE8214
		Task No.	300/302

Title of Computations: **Leachate Calculations**

Computations by:	Signature		7/25/2012 Date
	Printed Name	Omer Bozok	
	Title	Senior Staff Engineer	
Assumptions and Procedures Checked by: (peer reviewer)	Signature		8/16/2012 Date
	Printed Name	Brad Bodine, PE	
	Title	Project Engineer	
Computations Checked by:	Signature		8/16/2012 Date
	Printed Name	Brad Bodine, PE	
	Title	Project Engineer	
Computations backchecked by: (originator)	Signature		8/16/2012 Date
	Printed Name	Omer Bozok	
	Title	Senior Staff Engineer	
Approved by: (pm or designate)	Signature		10/17/2012 Date
	Printed Name	John Seymour, PE	
	Title	Principal	

Approval notes:

Revisions (number and initial all revisions)

No.	Sheet	Date	By	Checked by	Approval
1	Page 4	4/14/14	OB	BDB	JRS

Written by:	**OB**	Date:	**07/25/12**	Reviewed by:	**BB**	Date:	**08/16/12**
Revised by		Date		Reviewed by	**JPS**	Date	**10/17/12**
Client: **BFINA**	Project:	**MIG/DeWane Landfill**		Project/ Proposal No.:	**CHE8214**	Task No.:	**300/302**

LEACHATE CALCULATIONS

PURPOSE

Leachate can be generated by waste within the landfill as well as from stormwater infiltrating through the landfill cover. The purpose of this calculation package is: (i) to estimate the volume of leachate that would be collected following the enhancement of the cover system; and (ii) to size leachate storage tanks.

METHOD FOR CALCULATIONS

Geosyntec calculated the volume of leachate within the landfill by comparing two different contour maps using the AutoCAD Civil 3D 2011 (by Autodesk®) software program. The two contour maps are: (i) a leachate contour map generated with the Surfer® 7 (Golden Software) software program using the 2008 leachate levels obtained from passive gas vents and dual phase vents; and (ii) a horizontal base plane that is at elevation 785 ft. The elevation 785 ft was selected as a conservative base surface for the horizontal plane because it is the lowest point along the proposed leachate collection trench system.

Following the volume calculations, Geosyntec further analyzed the leachate calculations by taking into account: (i) porosity of waste; (ii) area of leachate contour map relative to landfill footprint area; and (iii) stormwater infiltrating through the cover system.

CALCULATIONS

Several iterations of volume estimates were performed in calculating the final estimate of leachate volume in the landfill. First, the bulk volume between El. 785 ft and top of leachate is calculated. The results of volume calculations are provided in **Figure 1**. The "Net Volume" was the bulk volume between the "Base Surface" (horizontal plane at El. 785 ft) and "Comparison Surface" (leachate contour map), which is approximately 42,000 Cu. Yd (**Figure 1**). However, the area of the leachate contour map only accounts for 77 percent of the footprint area of the landfill, as shown in **Figure 1**. Over the remaining footprint area of the landfill (shaded area in **Figure 1**), the leachate elevation is expected be lower towards the toe of the landfill than the middle of the landfill, therefore the shaded area is estimated to contain additional 10 percent of the calculated bulk volume (42,000 Cu. Yd.), resulting in total bulk volume of 46,200 Cu Yd. The waste porosity was then taken into consideration and estimated to be 0.5 (Miller and Clesceri, 2002). The final volume of leachate was then calculated as:

46,200 Cu. Yd. x 0.5 = 23,100 Cu. Yd. (~4,665,000 gallon)

Based on Bonaparte et al., (2002) the amount of generated leachate decreases following the closure of the landfill. The reduction rates are summarized in **Table 1**. Although Bonaparte et al., (2002) indicates the data used to determine the decrease in leachate generated is from modern landfills with a geomembrane or composite landfill cover, Geosyntec considers this leachate reduction estimate a conservative approach for the MIG/Dewane Landfill. The MIG/DeWane Landfill has been closed and covered for approximately 19 years, with a thick (as much as 18 feet thick) compacted clay liner for the landfill cover. The existing leachate surface impoundment east of the landfill previously collected leachate from the landfill's leachate collection system, but is now essentially dry. Additionally, a significant reduction in leachate levels within the landfill has been observed by measuring leachate levels in 58 gas vents/wells on the landfill surface. An additional leachate collection system is planned for the landfill, which will initially generate leachate by further reducing the leachate levels within the landfill. It is this additional leachate generation from the planned leachate collection system that is expected to reduce over time.

Table 1. Summary of Reduction in Leachate Generation Rates – Post Closure (Bonaparte et. al., 2002).

Year	Reduction in Leachate Generation
1	0%
2	30%
3	50%
4	70%
5	85%
6	93%
7	97%
8	99%

A steady state amount of stormwater infiltration through the cover system was added to existing leachate in the landfill. Modeling of additional leachate generation due to infiltration was performed using the Hydrologic Evaluation of Landfill Performance (HELP) model, Version 3.07, developed by the U.S. Environmental Protection Agency (USEPA) (Schroeder et al., 1994 a, b).

The estimated total collected leachate volume, including the reduced leachate generation volumes and stormwater infiltration for the years following the closure are provided in **Table 2**.

Table 2. Amount of Leachate Collected Following the Repair and Improvement of the Existing Cover System.

Year	Volume of Leachate Collected (gallons)	Reduction in Leachate Generation	Stormwater Infiltration (gallons)[1]	Total Leachate Collected (gallons)
1st	1,690,000	0%	760,000	2,450,000
2nd	1,183,000	30%	760,000	1,943,000
3rd	845,000	50%	760,000	1,605,000
4th	507,000	70%	760,000	1,267,000
5th	254,000	85%	760,000	1,014,000
6th	117,000	93%	760,000	877,000
7th	50,000	97%	760,000	810,000
8th	19,000	99%	760,000	779,000
Total	**4,665,000**		**6,080,000**	**10,800,000**

[1]Obtained from HELP model calculations for the existing cover system, see Technical Memorandum - Modified Remedy (Geosyntec, 2012).

CONCLUSIONS

- Calculations indicate that approximately 10,800,000 gallon of leachate will have been collected by the end of 8th year following the enhancement of cover system.
- The leachate storage tank must be able to collect approximately 6,700 gallon of leachate per day based on the 1st year's leachate volume estimate of 2,450,000 gallon.
- The designed leachate collection system is 3,800-ft long. Approximately 30 percent of the collection system will drain to northwest corner of the site and

Written by:	OB	Date:	07/25/12	Reviewed by:	BB	Date:	08/16/12
Revised by		Date		Reviewed by	JPS	Date	10/17/12
Client: BFINA	Project:	MIG/DeWane Landfill		Project/ Proposal No.:	CHE8214	Task No.:	300/302

approximately 70 percent of the leachate collection system will drain to southeast corner of the site. Therefore, the leachate collection system shall have a capacity to collect approximately 2,000 gallon of leachate at the northwest corner of the site and approximately 4,500 gallon at the southeast corner of the site.

REFERENCES

Bonaparte, R., Daniel, D., Koerner, R., (2002) "*Assessment and Recommendations for improving the Performance of Waste Containment Systems*" EPA/600/R-02/09

Geosyntec Consultants, (2012) "*Technical Memorandum – Modified Remedy*" MIG/DeWane Landfill Site, Belvidere, IL

Miller, P. and Clesceri, M. (2002) "*Waste Sites and Biological Reactors*", CRC Press, 383 pages

Schroeder, P.R., Lloyd, C.M., and Zappi, P.A. (1994a) "*The Hydrologic Evaluation of Landfill Performance (HELP) Model, User's Guide for Version 3.*" U.S. Environmental Protection Agency, Office of Research and Development Washington, D.C., Report No. EPA/600/R094/168a.

Schroeder, P.R., Dozier, T.S., Zappi, P.A., McEnroe, B.M., Sjostrom, J.W., and Peyton, R.L. (1994b) "*The Hydrologic Evaluation of Landfill Performance (HELP) Model Engineering Documentation for Version 3.*" U.S. Environmental Protection Agency, Office of Research and Development, Washington, D.C., Report No. EPA/600/R-94/168b, 116 p.

Appendix E

Gas System Analyses

COMPUTATION COVER SHEET

Client: ______ Project: **MIG/DeWane Landfill** Project/ Proposal No.: **CHE8214** Task No. **302**

Title of Computations **LandGEM Analyses**

Computations by:	Signature		
	Printed Name	John Hargrove	Date
	Title	Senior Project Professional	4/25/07
Assumptions and Procedures Checked by: (peer reviewer)	Signature		
	Printed Name		Date
	Title		
Computations Checked by:	Signature		
	Printed Name		Date
	Title		
Approved by: (pm or designate)	Signature		
	Printed Name	John Seymour, PE	Date: 2007/04/25
	Title	Associate/Project Manager	

Approval notes:

Revisions (number and initial all revisions)

No.	Sheet	Date	By	Checked by	Approval

MIG DEWANE LANDFILL
LandGEM Analyses

PURPOSE

The purpose of these calculations is to estimate the existing and potential landfill gas generation rates using the output from the United States Environmental Protection Agency (USEPA) Landfill Gas Emissions Model (LandGEM Version 3.02). For estimation of uncontrolled methane emissions from landfills, a theoretical first-order kinetic model of methane production developed by the USEPA is typically used. This equation is utilized in the LandGEM, and is provided below:

$$Q_{CH4} = L_o R (e^{-kc} - e^{-kt})$$

where:

Q_{CH4} = Methane generation rate at time t, m^3/yr;

L_o = Methane generation potential, m^3 CH_4/Mg refuse;

R = Average annual refuse acceptance rate during active life, Mg/yr;

e = Base log, unitless;

k = methane generation rate constant, yr^{-1};

c = time since landfill closure, yrs (c = 0 for active landfills); and

t = time since the initial refuse placement, yrs.

The average annual refuse acceptance rates during the active life of the landfill are required to provide the methane emission estimate. Other required values for methane generation estimation are L_o and k. These values must be estimated. The L_o value is based on the moisture and organic content of the refuse and the percentage of that waste mass that is considered putrescible. The k value is based on a variety of factors, including moisture content, pH, temperature, and other environmental factors, and landfill operating conditions.

For landfill gas generation estimation, the US EPA has developed a set of emission factors for landfill gas constituents. These emission factors are presented in AP-42. In addition to providing default emission factors for point sources of landfill gas, AP-42 provides default values for use in determination of landfill gas generation. The AP-42 default value for L_0 is 100 m^3/Mg. For landfill sites where annual precipitation is greater than 25 inches per year, the AP-42 default value for k is 0.04/yr.

ASSUMED CONDITIONS

1. The following assumptions are based on information from the Remedial Investigation Report (Clayton, 1997):

   a. The total landfill capacity is 3,715,200 cubic yards; and

   b. The landfill operated from 1969 to 1988 (20 years).

2. The waste intake was evenly distributed during the 20 year period. Dividing 3,715,200 cubic yards by 20 years yields an intake rate of 185,760 cubic yards per year.

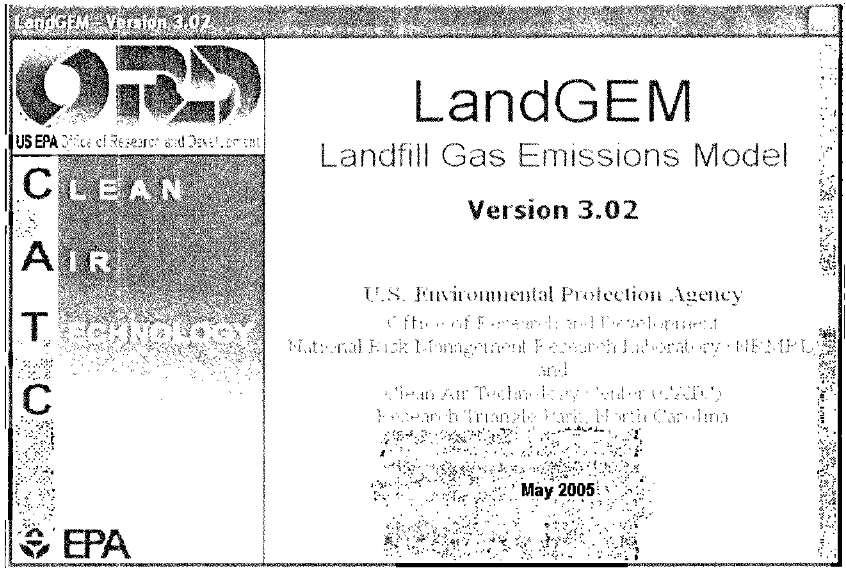
3. Using a waste density of 1400 pounds per cubic yard, the annual waste intake is 130,032 tons.

4. The assumed waste composition is typical MSW.

5. The assumed k value for the LandGEM is 0.04 per year. The assumed L_0 is 100 cubic meters per Mg. These values are the recommended values for a site which receives greater than 25 inches of annual precipitation.

RESULT

The resulting annual landfill gas generation rates for 1970 through 2109 are attached. For 2007, the gas generation rate is 427 scfm.



Summary Report

Landfill Name or Identifier: MIG De Wane LF Boone Co IL

Date: Wednesday, April 25, 2007

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} kL_o \left(\frac{M_i}{10} \right) e^{-kt_{ij}}$$

Where,

Q_{CH4} = annual methane generation in the year of the calculation *(m^3/year)*

i = 1-year time increment

n = (year of the calculation) - (initial year of waste acceptance)

j = 0.1-year time increment

k = methane generation rate *(year^{-1})*

L_o = potential methane generation capacity *(m^3/Mg)*

M_i = mass of waste accepted in the i^{th} year *(Mg)*

t_{ij} = age of the j^{th} section of waste mass M_i accepted in the i^{th} year *(decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**1969**	
Landfill Closure Year (with 80-year limit)	**1988**	
Actual Closure Year (without limit)	***1988***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity	**2,600,640**	*short tons*

MODEL PARAMETERS

Methane Generation Rate, k	**0.040**	*year^{-1}*
Potential Methane Generation Capacity, L_o	**100**	*m^3/Mg*
NMOC Concentration	**600**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
1969	118,211	130,032	0	0
1970	118,211	130,032	118,211	130,032
1971	118,211	130,032	236,422	260,064
1972	118,211	130,032	354,633	390,096
1973	118,211	130,032	472,844	520,128
1974	118,211	130,032	591,055	650,160
1975	118,211	130,032	709,265	780,192
1976	118,211	130,032	827,476	910,224
1977	118,211	130,032	945,687	1,040,256
1978	118,211	130,032	1,063,898	1,170,288
1979	118,211	130,032	1,182,109	1,300,320
1980	118,211	130,032	1,300,320	1,430,352
1981	118,211	130,032	1,418,531	1,560,384
1982	118,211	130,032	1,536,742	1,690,416
1983	118,211	130,032	1,654,953	1,820,448
1984	118,211	130,032	1,773,164	1,950,480
1985	118,211	130,032	1,891,375	2,080,512
1986	118,211	130,032	2,009,585	2,210,544
1987	118,211	130,032	2,127,796	2,340,576
1988	118,211	130,032	2,246,007	2,470,608
1989	0	0	2,364,218	2,600,640
1990	0	0	2,364,218	2,600,640
1991	0	0	2,364,218	2,600,640
1992	0	0	2,364,218	2,600,640
1993	0	0	2,364,218	2,600,640
1994	0	0	2,364,218	2,600,640
1995	0	0	2,364,218	2,600,640
1996	0	0	2,364,218	2,600,640
1997	0	0	2,364,218	2,600,640
1998	0	0	2,364,218	2,600,640
1999	0	0	2,364,218	2,600,640
2000	0	0	2,364,218	2,600,640
2001	0	0	2,364,218	2,600,640
2002	0	0	2,364,218	2,600,640
2003	0	0	2,364,218	2,600,640
2004	0	0	2,364,218	2,600,640
2005	0	0	2,364,218	2,600,640
2006	0	0	2,364,218	2,600,640
2007	0	0	2,364,218	2,600,640
2008	0	0	2,364,218	2,600,640

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
09	0	0	2,364,218	2,600,640
2010	0	0	2,364,218	2,600,640
2011	0	0	2,364,218	2,600,640
2012	0	0	2,364,218	2,600,640
2013	0	0	2,364,218	2,600,640
2014	0	0	2,364,218	2,600,640
2015	0	0	2,364,218	2,600,640
2016	0	0	2,364,218	2,600,640
2017	0	0	2,364,218	2,600,640
2018	0	0	2,364,218	2,600,640
2019	0	0	2,364,218	2,600,640
2020	0	0	2,364,218	2,600,640
2021	0	0	2,364,218	2,600,640
2022	0	0	2,364,218	2,600,640
2023	0	0	2,364,218	2,600,640
2024	0	0	2,364,218	2,600,640
2025	0	0	2,364,218	2,600,640
2026	0	0	2,364,218	2,600,640
2027	0	0	2,364,218	2,600,640
2028	0	0	2,364,218	2,600,640
2029	0	0	2,364,218	2,600,640
2030	0	0	2,364,218	2,600,640
2031	0	0	2,364,218	2,600,640
2032	0	0	2,364,218	2,600,640
2033	0	0	2,364,218	2,600,640
2034	0	0	2,364,218	2,600,640
2035	0	0	2,364,218	2,600,640
2036	0	0	2,364,218	2,600,640
2037	0	0	2,364,218	2,600,640
2038	0	0	2,364,218	2,600,640
39	0	0	2,364,218	2,600,640
40	0	0	2,364,218	2,600,640
2041	0	0	2,364,218	2,600,640
2042	0	0	2,364,218	2,600,640
2043	0	0	2,364,218	2,600,640
2044	0	0	2,364,218	2,600,640
2045	0	0	2,364,218	2,600,640
2046	0	0	2,364,218	2,600,640
2047	0	0	2,364,218	2,600,640
2048	0	0	2,364,218	2,600,640

Pollutant Parameters

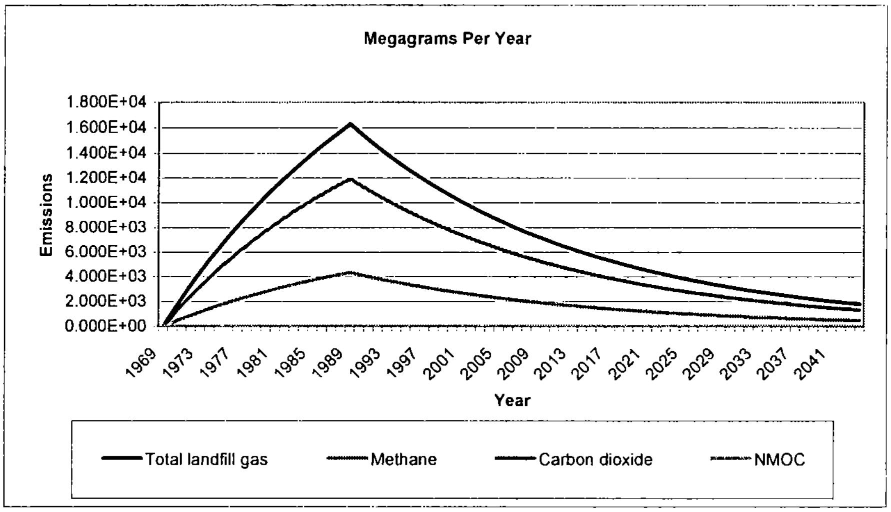
	Gas / Pollutant Default Parameters:			User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

Pollutant Parameters (Continued)

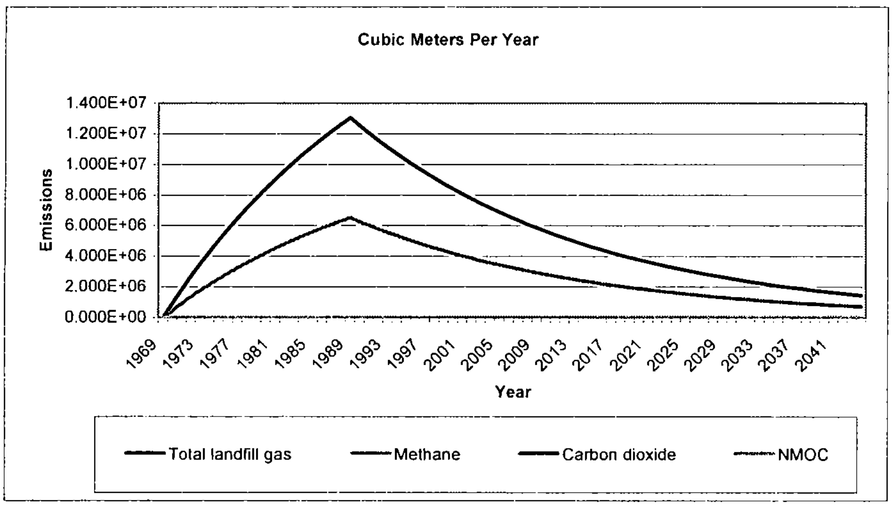
	Gas / Pollutant Default Parameters:		User-specified Pollutant Parameters:	
Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
Ethylbenzene - HAP/VOC	4.6	106.16		
Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
Fluorotrichloromethane - VOC	0.76	137.38		
Hexane - HAP/VOC	6.6	86.18		
Hydrogen sulfide	36	34.08		
Mercury (total) - HAP	2.9E-04	200.61		
Methyl ethyl ketone - HAP/VOC	7.1	72.11		
Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
Methyl mercaptan - VOC	2.5	48.11		
Pentane - VOC	3.3	72.15		
Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
Propane - VOC	11	44.09		
t-1,2-Dichloroethene - VOC	2.8	96.94		
Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
Toluene - Co-disposal - HAP/VOC	170	92.13		
Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
Vinyl chloride - HAP/VOC	7.3	62.50		
Xylenes - HAP/VOC	12	106.16		

Pollutants

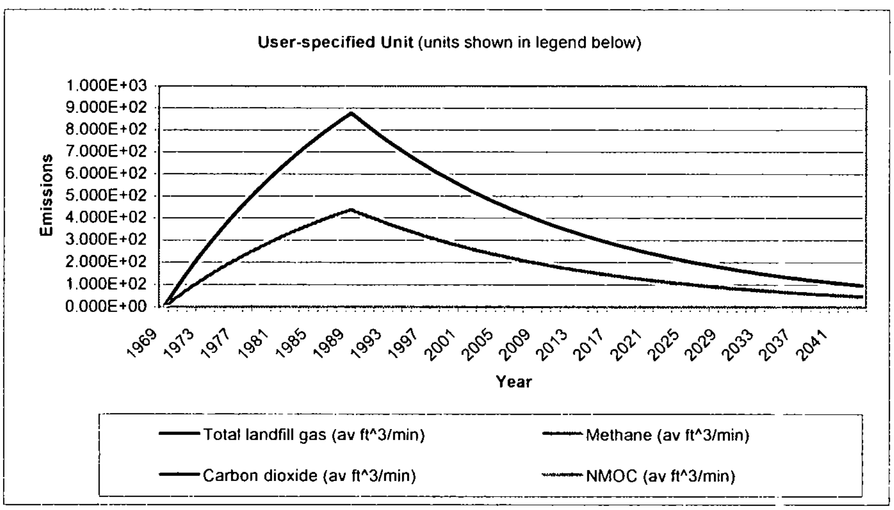
Graphs



Megagrams Per Year
1.800E+04
1.600E+04
1.400E+04
1.200E+04
1.000E+04
8.000E+03
6.000E+03
4.000E+03
2.000E+03
0.000E+00
Emissions
1969 1973 1977 1981 1985 1989 1993 1997 2001 2005 2009 2013 2017 2021 2025 2029 2033 2037 2041
Year
Total landfill gas
Methane
Carbon dioxide
NMOC



Cubic Meters Per Year
1.400E+07
1.200E+07
1.000E+07
8.000E+06
6.000E+06
4.000E+06
2.000E+06
0.000E+00
Emissions
1969 1973 1977 1981 1985 1989 1993 1997 2001 2005 2009 2013 2017 2021 2025 2029 2033 2037 2041
Year
Total landfill gas
Methane
Carbon dioxide
NMOC



User-specified Unit (units shown in legend below)
1.000E+03
9.000E+02
8.000E+02
7.000E+02
6.000E+02
5.000E+02
4.000E+02
3.000E+02
2.000E+02
1.000E+02
0.000E+00
Emissions
1969 1973 1977 1981 1985 1989 1993 1997 2001 2005 2009 2013 2017 2021 2025 2029 2033 2037 2041
Year
Total landfill gas (av ft^3/min)
Methane (av ft^3/min)
Carbon dioxide (av ft^3/min)
NMOC (av ft^3/min)

Results

ear	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
1969	0	0	0	0	0	0
1970	1.160E+03	9.289E+05	6.241E+01	3.098E+02	4.644E+05	3.121E+01
1971	2.275E+03	1.821E+06	1.224E+02	6.076E+02	9.107E+05	6.119E+01
1972	3.345E+03	2.679E+06	1.800E+02	8.936E+02	1.339E+06	8.999E+01
1973	4.374E+03	3.503E+06	2.353E+02	1.168E+03	1.751E+06	1.177E+02
1974	5.363E+03	4.294E+06	2.885E+02	1.432E+03	2.147E+06	1.443E+02
1975	6.312E+03	5.055E+06	3.396E+02	1.686E+03	2.527E+06	1.698E+02
1976	7.225E+03	5.785E+06	3.887E+02	1.930E+03	2.893E+06	1.944E+02
1977	8.102E+03	6.487E+06	4.359E+02	2.164E+03	3.244E+06	2.179E+02
1978	8.944E+03	7.162E+06	4.812E+02	2.389E+03	3.581E+06	2.406E+02
1979	9.753E+03	7.810E+06	5.247E+02	2.605E+03	3.905E+06	2.624E+02
1980	1.053E+04	8.433E+06	5.666E+02	2.813E+03	4.216E+06	2.833E+02
1981	1.128E+04	9.031E+06	6.068E+02	3.012E+03	4.515E+06	3.034E+02
1982	1.200E+04	9.606E+06	6.454E+02	3.204E+03	4.803E+06	3.227E+02
1983	1.269E+04	1.016E+07	6.825E+02	3.388E+03	5.079E+06	3.413E+02
1984	1.335E+04	1.069E+07	7.182E+02	3.565E+03	5.344E+06	3.591E+02
1985	1.398E+04	1.120E+07	7.524E+02	3.735E+03	5.599E+06	3.762E+02
1986	1.460E+04	1.169E+07	7.853E+02	3.899E+03	5.844E+06	3.927E+02
1987	1.518E+04	1.216E+07	8.169E+02	4.056E+03	6.079E+06	4.085E+02
1988	1.575E+04	1.261E+07	8.473E+02	4.207E+03	6.305E+06	4.237E+02
1989	1.629E+04	1.305E+07	8.765E+02	4.352E+03	6.523E+06	4.383E+02
1990	1.565E+04	1.253E+07	8.421E+02	4.181E+03	6.267E+06	4.211E+02
1991	1.504E+04	1.204E+07	8.091E+02	4.017E+03	6.021E+06	4.046E+02
1992	1.445E+04	1.157E+07	7.774E+02	3.859E+03	5.785E+06	3.887E+02
1993	1.388E+04	1.112E+07	7.469E+02	3.708E+03	5.558E+06	3.735E+02
1994	1.334E+04	1.068E+07	7.176E+02	3.563E+03	5.340E+06	3.588E+02
1995	1.281E+04	1.026E+07	6.895E+02	3.423E+03	5.131E+06	3.447E+02
1996	1.231E+04	9.859E+06	6.624E+02	3.289E+03	4.930E+06	3.312E+02
1997	1.183E+04	9.473E+06	6.365E+02	3.160E+03	4.736E+06	3.182E+02
1998	1.137E+04	9.101E+06	6.115E+02	3.036E+03	4.551E+06	3.058E+02
1999	1.092E+04	8.744E+06	5.875E+02	2.917E+03	4.372E+06	2.938E+02
2000	1.049E+04	8.402E+06	5.645E+02	2.803E+03	4.201E+06	2.822E+02
2001	1.008E+04	8.072E+06	5.424E+02	2.693E+03	4.036E+06	2.712E+02
2002	9.685E+03	7.756E+06	5.211E+02	2.587E+03	3.878E+06	2.605E+02
2003	9.306E+03	7.451E+06	5.007E+02	2.486E+03	3.726E+06	2.503E+02
2004	8.941E+03	7.159E+06	4.810E+02	2.388E+03	3.580E+06	2.405E+02
2005	8.590E+03	6.879E+06	4.622E+02	2.295E+03	3.439E+06	2.311E+02
2006	8.253E+03	6.609E+06	4.440E+02	2.205E+03	3.304E+06	2.220E+02
2007	7.930E+03	6.350E+06	4.266E+02	2.118E+03	3.175E+06	2.133E+02
2008	7.619E+03	6.101E+06	4.099E+02	2.035E+03	3.050E+06	2.050E+02
2009	7.320E+03	5.862E+06	3.938E+02	1.955E+03	2.931E+06	1.969E+02
2010	7.033E+03	5.632E+06	3.784E+02	1.879E+03	2.816E+06	1.892E+02
2011	6.757E+03	5.411E+06	3.636E+02	1.805E+03	2.705E+06	1.818E+02
2012	6.492E+03	5.199E+06	3.493E+02	1.734E+03	2.599E+06	1.747E+02
2013	6.238E+03	4.995E+06	3.356E+02	1.666E+03	2.497E+06	1.678E+02
2014	5.993E+03	4.799E+06	3.224E+02	1.601E+03	2.400E+06	1.612E+02
2015	5.758E+03	4.611E+06	3.098E+02	1.538E+03	2.305E+06	1.549E+02
2016	5.532E+03	4.430E+06	2.977E+02	1.478E+03	2.215E+06	1.488E+02
2017	5.315E+03	4.256E+06	2.860E+02	1.420E+03	2.128E+06	1.430E+02
2018	5.107E+03	4.089E+06	2.748E+02	1.364E+03	2.045E+06	1.374E+02

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2019	4.907E+03	3.929E+06	2.640E+02	1.311E+03	1.965E+06	1.320E+02
2020	4.714E+03	3.775E+06	2.536E+02	1.259E+03	1.888E+06	1.268E+02
2021	4.530E+03	3.627E+06	2.437E+02	1.210E+03	1.814E+06	1.218E+02
2022	4.352E+03	3.485E+06	2.341E+02	1.162E+03	1.742E+06	1.171E+02
2023	4.181E+03	3.348E+06	2.250E+02	1.117E+03	1.674E+06	1.125E+02
2024	4.017E+03	3.217E+06	2.161E+02	1.073E+03	1.608E+06	1.081E+02
2025	3.860E+03	3.091E+06	2.077E+02	1.031E+03	1.545E+06	1.038E+02
2026	3.708E+03	2.970E+06	1.995E+02	9.906E+02	1.485E+06	9.976E+01
2027	3.563E+03	2.853E+06	1.917E+02	9.517E+02	1.427E+06	9.585E+01
2028	3.423E+03	2.741E+06	1.842E+02	9.144E+02	1.371E+06	9.209E+01
2029	3.289E+03	2.634E+06	1.770E+02	8.786E+02	1.317E+06	8.848E+01
2030	3.160E+03	2.530E+06	1.700E+02	8.441E+02	1.265E+06	8.501E+01
2031	3.036E+03	2.431E+06	1.634E+02	8.110E+02	1.216E+06	8.168E+01
2032	2.917E+03	2.336E+06	1.570E+02	7.792E+02	1.168E+06	7.848E+01
2033	2.803E+03	2.244E+06	1.508E+02	7.487E+02	1.122E+06	7.540E+01
2034	2.693E+03	2.156E+06	1.449E+02	7.193E+02	1.078E+06	7.244E+01
2035	2.587E+03	2.072E+06	1.392E+02	6.911E+02	1.036E+06	6.960E+01
2036	2.486E+03	1.991E+06	1.337E+02	6.640E+02	9.953E+05	6.687E+01
2037	2.388E+03	1.913E+06	1.285E+02	6.380E+02	9.563E+05	6.425E+01
2038	2.295E+03	1.838E+06	1.235E+02	6.129E+02	9.188E+05	6.173E+01
2039	2.205E+03	1.765E+06	1.186E+02	5.889E+02	8.827E+05	5.931E+01
2040	2.118E+03	1.696E+06	1.140E+02	5.658E+02	8.481E+05	5.699E+01
2041	2.035E+03	1.630E+06	1.095E+02	5.436E+02	8.149E+05	5.475E+01
2042	1.955E+03	1.566E+06	1.052E+02	5.223E+02	7.829E+05	5.260E+01
2043	1.879E+03	1.504E+06	1.011E+02	5.018E+02	7.522E+05	5.054E+01
2044	1.805E+03	1.445E+06	9.712E+01	4.822E+02	7.227E+05	4.856E+01
2045	1.734E+03	1.389E+06	9.331E+01	4.633E+02	6.944E+05	4.666E+01
2046	1.666E+03	1.334E+06	8.965E+01	4.451E+02	6.672E+05	4.483E+01
2047	1.601E+03	1.282E+06	8.614E+01	4.276E+02	6.410E+05	4.307E+01
2048	1.538E+03	1.232E+06	8.276E+01	4.109E+02	6.159E+05	4.138E+01
2049	1.478E+03	1.183E+06	7.951E+01	3.948E+02	5.917E+05	3.976E+01
2050	1.420E+03	1.137E+06	7.640E+01	3.793E+02	5.685E+05	3.820E+01
2051	1.364E+03	1.092E+06	7.340E+01	3.644E+02	5.462E+05	3.670E+01
2052	1.311E+03	1.050E+06	7.052E+01	3.501E+02	5.248E+05	3.526E+01
2053	1.259E+03	1.008E+06	6.776E+01	3.364E+02	5.042E+05	3.388E+01
2054	1.210E+03	9.689E+05	6.510E+01	3.232E+02	4.845E+05	3.255E+01
2055	1.163E+03	9.309E+05	6.255E+01	3.105E+02	4.655E+05	3.127E+01
2056	1.117E+03	8.944E+05	6.010E+01	2.984E+02	4.472E+05	3.005E+01
2057	1.073E+03	8.593E+05	5.774E+01	2.867E+02	4.297E+05	2.887E+01
2058	1.031E+03	8.256E+05	5.548E+01	2.754E+02	4.128E+05	2.774E+01
2059	9.907E+02	7.933E+05	5.330E+01	2.646E+02	3.966E+05	2.665E+01
2060	9.518E+02	7.622E+05	5.121E+01	2.542E+02	3.811E+05	2.561E+01
2061	9.145E+02	7.323E+05	4.920E+01	2.443E+02	3.661E+05	2.460E+01
2062	8.786E+02	7.036E+05	4.727E+01	2.347E+02	3.518E+05	2.364E+01
2063	8.442E+02	6.760E+05	4.542E+01	2.255E+02	3.380E+05	2.271E+01
2064	8.111E+02	6.495E+05	4.364E+01	2.166E+02	3.247E+05	2.182E+01
2065	7.793E+02	6.240E+05	4.193E+01	2.082E+02	3.120E+05	2.096E+01
2066	7.487E+02	5.995E+05	4.028E+01	2.000E+02	2.998E+05	2.014E+01
2067	7.194E+02	5.760E+05	3.870E+01	1.922E+02	2.880E+05	1.935E+01
2068	6.912E+02	5.534E+05	3.719E+01	1.846E+02	2.767E+05	1.859E+01
2069	6.641E+02	5.317E+05	3.573E+01	1.774E+02	2.659E+05	1.786E+01

Results (Continued)

ear	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2070	6.380E+02	5.109E+05	3.433E+01	1.704E+02	2.554E+05	1.716E+01
2071	6.130E+02	4.909E+05	3.298E+01	1.637E+02	2.454E+05	1.649E+01
2072	5.890E+02	4.716E+05	3.169E+01	1.573E+02	2.358E+05	1.584E+01
2073	5.659E+02	4.531E+05	3.045E+01	1.512E+02	2.266E+05	1.522E+01
2074	5.437E+02	4.354E+05	2.925E+01	1.452E+02	2.177E+05	1.463E+01
2075	5.224E+02	4.183E+05	2.810E+01	1.395E+02	2.091E+05	1.405E+01
2076	5.019E+02	4.019E+05	2.700E+01	1.341E+02	2.009E+05	1.350E+01
2077	4.822E+02	3.861E+05	2.594E+01	1.288E+02	1.931E+05	1.297E+01
2078	4.633E+02	3.710E+05	2.493E+01	1.238E+02	1.855E+05	1.246E+01
2079	4.451E+02	3.564E+05	2.395E+01	1.189E+02	1.782E+05	1.197E+01
2080	4.277E+02	3.425E+05	2.301E+01	1.142E+02	1.712E+05	1.151E+01
2081	4.109E+02	3.290E+05	2.211E+01	1.098E+02	1.645E+05	1.105E+01
2082	3.948E+02	3.161E+05	2.124E+01	1.055E+02	1.581E+05	1.062E+01
2083	3.793E+02	3.037E+05	2.041E+01	1.013E+02	1.519E+05	1.020E+01
2084	3.644E+02	2.918E+05	1.961E+01	9.735E+01	1.459E+05	9.804E+00
2085	3.502E+02	2.804E+05	1.884E+01	9.353E+01	1.402E+05	9.420E+00
2086	3.364E+02	2.694E+05	1.810E+01	8.986E+01	1.347E+05	9.050E+00
2087	3.232E+02	2.588E+05	1.739E+01	8.634E+01	1.294E+05	8.695E+00
2088	3.106E+02	2.487E+05	1.671E+01	8.295E+01	1.243E+05	8.354E+00
2089	2.984E+02	2.389E+05	1.605E+01	7.970E+01	1.195E+05	8.027E+00
2090	2.867E+02	2.296E+05	1.542E+01	7.658E+01	1.148E+05	7.712E+00
2091	2.754E+02	2.206E+05	1.482E+01	7.357E+01	1.103E+05	7.410E+00
2092	2.646E+02	2.119E+05	1.424E+01	7.069E+01	1.060E+05	7.119E+00
2093	2.543E+02	2.036E+05	1.368E+01	6.792E+01	1.018E+05	6.840E+00
2094	2.443E+02	1.956E+05	1.314E+01	6.525E+01	9.781E+04	6.572E+00
2095	2.347E+02	1.879E+05	1.263E+01	6.269E+01	9.397E+04	6.314E+00
2096	2.255E+02	1.806E+05	1.213E+01	6.024E+01	9.029E+04	6.067E+00
2097	2.167E+02	1.735E+05	1.166E+01	5.787E+01	8.675E+04	5.829E+00
?098	2.082E+02	1.667E+05	1.120E+01	5.561E+01	8.335E+04	5.600E+00
99	2.000E+02	1.602E+05	1.076E+01	5.343E+01	8.008E+04	5.381E+00
100	1.922E+02	1.539E+05	1.034E+01	5.133E+01	7.694E+04	5.170E+00
2101	1.846E+02	1.478E+05	9.934E+00	4.932E+01	7.392E+04	4.967E+00
2102	1.774E+02	1.420E+05	9.544E+00	4.738E+01	7.102E+04	4.772E+00
2103	1.704E+02	1.365E+05	9.170E+00	4.553E+01	6.824E+04	4.585E+00
2104	1.638E+02	1.311E+05	8.810E+00	4.374E+01	6.556E+04	4.405E+00
2105	1.573E+02	1.260E+05	8.465E+00	4.203E+01	6.299E+04	4.232E+00
2106	1.512E+02	1.210E+05	8.133E+00	4.038E+01	6.052E+04	4.067E+00
2107	1.452E+02	1.163E+05	7.814E+00	3.879E+01	5.815E+04	3.907E+00
2108	1.395E+02	1.117E+05	7.508E+00	3.727E+01	5.587E+04	3.754E+00
2109	1.341E+02	1.074E+05	7.213E+00	3.581E+01	5.368E+04	3.607E+00

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
1969	0	0	0	0	0	0
1970	8.502E+02	4.644E+05	3.121E+01	1.998E+00	5.573E+02	3.745E-02
1971	1.667E+03	9.107E+05	6.119E+01	3.917E+00	1.093E+03	7.343E-02
1972	2.452E+03	1.339E+06	8.999E+01	5.761E+00	1.607E+03	1.080E-01
1973	3.206E+03	1.751E+06	1.177E+02	7.533E+00	2.102E+03	1.412E-01
1974	3.930E+03	2.147E+06	1.443E+02	9.235E+00	2.577E+03	1.731E-01
1975	4.626E+03	2.527E+06	1.698E+02	1.087E+01	3.033E+03	2.038E-01
1976	5.295E+03	2.893E+06	1.944E+02	1.244E+01	3.471E+03	2.332E-01
1977	5.938E+03	3.244E+06	2.179E+02	1.395E+01	3.892E+03	2.615E-01
1978	6.555E+03	3.581E+06	2.406E+02	1.540E+01	4.297E+03	2.887E-01
1979	7.148E+03	3.905E+06	2.624E+02	1.680E+01	4.686E+03	3.148E-01
1980	7.718E+03	4.216E+06	2.833E+02	1.814E+01	5.060E+03	3.400E-01
1981	8.265E+03	4.515E+06	3.034E+02	1.942E+01	5.418E+03	3.641E-01
1982	8.792E+03	4.803E+06	3.227E+02	2.066E+01	5.763E+03	3.872E-01
1983	9.297E+03	5.079E+06	3.413E+02	2.185E+01	6.095E+03	4.095E-01
1984	9.783E+03	5.344E+06	3.591E+02	2.299E+01	6.413E+03	4.309E-01
1985	1.025E+04	5.599E+06	3.762E+02	2.408E+01	6.719E+03	4.514E-01
1986	1.070E+04	5.844E+06	3.927E+02	2.514E+01	7.013E+03	4.712E-01
1987	1.113E+04	6.079E+06	4.085E+02	2.615E+01	7.295E+03	4.902E-01
1988	1.154E+04	6.305E+06	4.237E+02	2.712E+01	7.566E+03	5.084E-01
1989	1.194E+04	6.523E+06	4.383E+02	2.806E+01	7.827E+03	5.259E-01
1990	1.147E+04	6.267E+06	4.211E+02	2.696E+01	7.520E+03	5.053E-01
1991	1.102E+04	6.021E+06	4.046E+02	2.590E+01	7.225E+03	4.855E-01
1992	1.059E+04	5.785E+06	3.887E+02	2.488E+01	6.942E+03	4.664E-01
1993	1.017E+04	5.558E+06	3.735E+02	2.391E+01	6.670E+03	4.481E-01
1994	9.775E+03	5.340E+06	3.588E+02	2.297E+01	6.408E+03	4.306E-01
1995	9.392E+03	5.131E+06	3.447E+02	2.207E+01	6.157E+03	4.137E-01
1996	9.024E+03	4.930E+06	3.312E+02	2.120E+01	5.916E+03	3.975E-01
1997	8.670E+03	4.736E+06	3.182E+02	2.037E+01	5.684E+03	3.819E-01
1998	8.330E+03	4.551E+06	3.058E+02	1.957E+01	5.461E+03	3.669E-01
1999	8.003E+03	4.372E+06	2.938E+02	1.881E+01	5.247E+03	3.525E-01
2000	7.689E+03	4.201E+06	2.822E+02	1.807E+01	5.041E+03	3.387E-01
2001	7.388E+03	4.036E+06	2.712E+02	1.736E+01	4.843E+03	3.254E-01
2002	7.098E+03	3.878E+06	2.605E+02	1.668E+01	4.653E+03	3.127E-01
2003	6.820E+03	3.726E+06	2.503E+02	1.603E+01	4.471E+03	3.004E-01
2004	6.553E+03	3.580E+06	2.405E+02	1.540E+01	4.296E+03	2.886E-01
2005	6.296E+03	3.439E+06	2.311E+02	1.479E+01	4.127E+03	2.773E-01
2006	6.049E+03	3.304E+06	2.220E+02	1.421E+01	3.965E+03	2.664E-01
2007	5.812E+03	3.175E+06	2.133E+02	1.366E+01	3.810E+03	2.560E-01
2008	5.584E+03	3.050E+06	2.050E+02	1.312E+01	3.660E+03	2.459E-01
2009	5.365E+03	2.931E+06	1.969E+02	1.261E+01	3.517E+03	2.363E-01
2010	5.154E+03	2.816E+06	1.892E+02	1.211E+01	3.379E+03	2.270E-01
2011	4.952E+03	2.705E+06	1.818E+02	1.164E+01	3.247E+03	2.181E-01
2012	4.758E+03	2.599E+06	1.747E+02	1.118E+01	3.119E+03	2.096E-01
2013	4.572E+03	2.497E+06	1.678E+02	1.074E+01	2.997E+03	2.014E-01
2014	4.392E+03	2.400E+06	1.612E+02	1.032E+01	2.879E+03	1.935E-01
2015	4.220E+03	2.305E+06	1.549E+02	9.916E+00	2.767E+03	1.859E-01
2016	4.055E+03	2.215E+06	1.488E+02	9.528E+00	2.658E+03	1.786E-01
2017	3.896E+03	2.128E+06	1.430E+02	9.154E+00	2.554E+03	1.716E-01
2018	3.743E+03	2.045E+06	1.374E+02	8.795E+00	2.454E+03	1.649E-01

Results (Continued)

'ar	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2019	3.596E+03	1.965E+06	1.320E+02	8.450E+00	2.357E+03	1.584E-01
2020	3.455E+03	1.888E+06	1.268E+02	8.119E+00	2.265E+03	1.522E-01
2021	3.320E+03	1.814E+06	1.218E+02	7.801E+00	2.176E+03	1.462E-01
2022	3.189E+03	1.742E+06	1.171E+02	7.495E+00	2.091E+03	1.405E-01
2023	3.064E+03	1.674E+06	1.125E+02	7.201E+00	2.009E+03	1.350E-01
2024	2.944E+03	1.608E+06	1.081E+02	6.918E+00	1.930E+03	1.297E-01
2025	2.829E+03	1.545E+06	1.038E+02	6.647E+00	1.854E+03	1.246E-01
2026	2.718E+03	1.485E+06	9.976E+01	6.387E+00	1.782E+03	1.197E-01
2027	2.611E+03	1.427E+06	9.585E+01	6.136E+00	1.712E+03	1.150E-01
2028	2.509E+03	1.371E+06	9.209E+01	5.896E+00	1.645E+03	1.105E-01
2029	2.411E+03	1.317E+06	8.848E+01	5.664E+00	1.580E+03	1.062E-01
2030	2.316E+03	1.265E+06	8.501E+01	5.442E+00	1.518E+03	1.020E-01
2031	2.225E+03	1.216E+06	8.168E+01	5.229E+00	1.459E+03	9.801E-02
2032	2.138E+03	1.168E+06	7.848E+01	5.024E+00	1.402E+03	9.417E-02
2033	2.054E+03	1.122E+06	7.540E+01	4.827E+00	1.347E+03	9.048E-02
2034	1.974E+03	1.078E+06	7.244E+01	4.638E+00	1.294E+03	8.693E-02
2035	1.896E+03	1.036E+06	6.960E+01	4.456E+00	1.243E+03	8.352E-02
2036	1.822E+03	9.953E+05	6.687E+01	4.281E+00	1.194E+03	8.025E-02
2037	1.750E+03	9.563E+05	6.425E+01	4.113E+00	1.148E+03	7.710E-02
2038	1.682E+03	9.188E+05	6.173E+01	3.952E+00	1.103E+03	7.408E-02
2039	1.616E+03	8.827E+05	5.931E+01	3.797E+00	1.059E+03	7.117E-02
2040	1.552E+03	8.481E+05	5.699E+01	3.648E+00	1.018E+03	6.838E-02
2041	1.492E+03	8.149E+05	5.475E+01	3.505E+00	9.778E+02	6.570E-02
2042	1.433E+03	7.829E+05	5.260E+01	3.368E+00	9.395E+02	6.312E-02
2043	1.377E+03	7.522E+05	5.054E+01	3.236E+00	9.027E+02	6.065E-02
2044	1.323E+03	7.227E+05	4.856E+01	3.109E+00	8.673E+02	5.827E-02
2045	1.271E+03	6.944E+05	4.666E+01	2.987E+00	8.333E+02	5.599E-02
2046	1.221E+03	6.672E+05	4.483E+01	2.870E+00	8.006E+02	5.379E-02
?047	1.173E+03	6.410E+05	4.307E+01	2.757E+00	7.692E+02	5.168E-02
48	1.127E+03	6.159E+05	4.138E+01	2.649E+00	7.390E+02	4.966E-02
J49	1.083E+03	5.917E+05	3.976E+01	2.545E+00	7.101E+02	4.771E-02
2050	1.041E+03	5.685E+05	3.820E+01	2.445E+00	6.822E+02	4.584E-02
2051	9.999E+02	5.462E+05	3.670E+01	2.349E+00	6.555E+02	4.404E-02
2052	9.607E+02	5.248E+05	3.526E+01	2.257E+00	6.298E+02	4.231E-02
2053	9.230E+02	5.042E+05	3.388E+01	2.169E+00	6.051E+02	4.065E-02
2054	8.868E+02	4.845E+05	3.255E+01	2.084E+00	5.813E+02	3.906E-02
2055	8.520E+02	4.655E+05	3.127E+01	2.002E+00	5.585E+02	3.753E-02
2056	8.186E+02	4.472E+05	3.005E+01	1.924E+00	5.366E+02	3.606E-02
2057	7.865E+02	4.297E+05	2.887E+01	1.848E+00	5.156E+02	3.464E-02
2058	7.557E+02	4.128E+05	2.774E+01	1.776E+00	4.954E+02	3.329E-02
2059	7.260E+02	3.966E+05	2.665E+01	1.706E+00	4.760E+02	3.198E-02
2060	6.976E+02	3.811E+05	2.561E+01	1.639E+00	4.573E+02	3.073E-02
2061	6.702E+02	3.661E+05	2.460E+01	1.575E+00	4.394E+02	2.952E-02
2062	6.439E+02	3.518E+05	2.364E+01	1.513E+00	4.221E+02	2.836E-02
2063	6.187E+02	3.380E+05	2.271E+01	1.454E+00	4.056E+02	2.725E-02
2064	5.944E+02	3.247E+05	2.182E+01	1.397E+00	3.897E+02	2.618E-02
2065	5.711E+02	3.120E+05	2.096E+01	1.342E+00	3.744E+02	2.516E-02
2066	5.487E+02	2.998E+05	2.014E+01	1.289E+00	3.597E+02	2.417E-02
2067	5.272E+02	2.880E+05	1.935E+01	1.239E+00	3.456E+02	2.322E-02
2068	5.065E+02	2.767E+05	1.859E+01	1.190E+00	3.321E+02	2.231E-02
2069	4.867E+02	2.659E+05	1.786E+01	1.144E+00	3.190E+02	2.144E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2070	4.676E+02	2.554E+05	1.716E+01	1.099E+00	3.065E+02	2.060E-02
2071	4.493E+02	2.454E+05	1.649E+01	1.056E+00	2.945E+02	1.979E-02
2072	4.316E+02	2.358E+05	1.584E+01	1.014E+00	2.830E+02	1.901E-02
2073	4.147E+02	2.266E+05	1.522E+01	9.745E-01	2.719E+02	1.827E-02
2074	3.985E+02	2.177E+05	1.463E+01	9.363E-01	2.612E+02	1.755E-02
2075	3.828E+02	2.091E+05	1.405E+01	8.996E-01	2.510E+02	1.686E-02
2076	3.678E+02	2.009E+05	1.350E+01	8.643E-01	2.411E+02	1.620E-02
2077	3.534E+02	1.931E+05	1.297E+01	8.304E-01	2.317E+02	1.557E-02
2078	3.395E+02	1.855E+05	1.246E+01	7.979E-01	2.226E+02	1.496E-02
2079	3.262E+02	1.782E+05	1.197E+01	7.666E-01	2.139E+02	1.437E-02
2080	3.134E+02	1.712E+05	1.151E+01	7.365E-01	2.055E+02	1.381E-02
2081	3.012E+02	1.645E+05	1.105E+01	7.077E-01	1.974E+02	1.326E-02
2082	2.893E+02	1.581E+05	1.062E+01	6.799E-01	1.897E+02	1.274E-02
2083	2.780E+02	1.519E+05	1.020E+01	6.532E-01	1.822E+02	1.224E-02
2084	2.671E+02	1.459E+05	9.804E+00	6.276E-01	1.751E+02	1.176E-02
2085	2.566E+02	1.402E+05	9.420E+00	6.030E-01	1.682E+02	1.130E-02
2086	2.466E+02	1.347E+05	9.050E+00	5.794E-01	1.616E+02	1.086E-02
2087	2.369E+02	1.294E+05	8.695E+00	5.567E-01	1.553E+02	1.043E-02
2088	2.276E+02	1.243E+05	8.354E+00	5.348E-01	1.492E+02	1.003E-02
2089	2.187E+02	1.195E+05	8.027E+00	5.139E-01	1.434E+02	9.632E-03
2090	2.101E+02	1.148E+05	7.712E+00	4.937E-01	1.377E+02	9.255E-03
2091	2.019E+02	1.103E+05	7.410E+00	4.744E-01	1.323E+02	8.892E-03
2092	1.940E+02	1.060E+05	7.119E+00	4.558E-01	1.271E+02	8.543E-03
2093	1.863E+02	1.018E+05	6.840E+00	4.379E-01	1.222E+02	8.208E-03
2094	1.790E+02	9.781E+04	6.572E+00	4.207E-01	1.174E+02	7.886E-03
2095	1.720E+02	9.397E+04	6.314E+00	4.042E-01	1.128E+02	7.577E-03
2096	1.653E+02	9.029E+04	6.067E+00	3.884E-01	1.083E+02	7.280E-03
2097	1.588E+02	8.675E+04	5.829E+00	3.731E-01	1.041E+02	6.994E-03
2098	1.526E+02	8.335E+04	5.600E+00	3.585E-01	1.000E+02	6.720E-03
2099	1.466E+02	8.008E+04	5.381E+00	3.445E-01	9.610E+01	6.457E-03
2100	1.408E+02	7.694E+04	5.170E+00	3.309E-01	9.233E+01	6.203E-03
2101	1.353E+02	7.392E+04	4.967E+00	3.180E-01	8.871E+01	5.960E-03
2102	1.300E+02	7.102E+04	4.772E+00	3.055E-01	8.523E+01	5.727E-03
2103	1.249E+02	6.824E+04	4.585E+00	2.935E-01	8.189E+01	5.502E-03
2104	1.200E+02	6.556E+04	4.405E+00	2.820E-01	7.868E+01	5.286E-03
2105	1.153E+02	6.299E+04	4.232E+00	2.710E-01	7.559E+01	5.079E-03
2106	1.108E+02	6.052E+04	4.067E+00	2.603E-01	7.263E+01	4.880E-03
2107	1.064E+02	5.815E+04	3.907E+00	2.501E-01	6.978E+01	4.688E-03
2108	1.023E+02	5.587E+04	3.754E+00	2.403E-01	6.704E+01	4.505E-03
2109	9.826E+01	5.368E+04	3.607E+00	2.309E-01	6.441E+01	4.328E-03

GEOSYNTEC CONSULTANTS

COMPUTATION COVER SHEET

lient: BFINA **Project:** MIG/De Wane Landfill **Project/Proposal #:** CHE8214 **Task #:** 300

300

TITLE OF COMPUTATIONS LANDFILL GAS PASSIVE VENT SYSTEM DESIGN

COMPUTATIONS BY:	Signature	Cao Yiwen	3/23/07 DATE
	Printed Name and Title	Yiwen Cao Project Engineer	
ASSUMPTIONS AND PROCEDURES CHECKED BY: (Peer Reviewer)	Signature	Majdi Ahmed Othman	3/23/07 DATE
	Printed Name and Title	Majdi Othman Associate	
COMPUTATIONS CHECKED BY:	Signature	Cao Yiwen	3/23/07 DATE
	Printed Name and Title	Yiwen Cao Project Engineer	
COMPUTATIONS BACKCHECKED BY: (Originator)	Signature	Cao Yiwen	3/23/07 DATE
	Printed Name and Title	Yiwen Cao Project Engineer	
APPROVED BY: (PM or Designate)	Signature	Majdi Ahmed Othman	3/23/07 DATE
	Printed Name and Title	Majdi Othman Associate	

APPROVAL NOTES:

REVISIONS (Number and initial all revisions)

NO.	SHEET	DATE	BY	CHECKED BY	APPROVAL

LANDFILL GAS PASSIVE VENT SYSTEM DESIGN

PURPOSE

The purpose of this analysis is to estimate the radius of influence (ROI) for passive gas vents to be used at the MIG/De Wane Landfill located in Belvidere, Boone County, IL. The effects of the final cover slope and vent depth into the waste on the vent ROI are assessed.

METHOD

Passive LFG Vent Design

The design of the passive landfill gas (LFG) venting system is based on methodology developed by Thiel [1998] and modified by Geosyntec Consultants (Geosyntec). The original design methodology by Thiel considers slope stability analyses to estimate the maximum allowable gas pressure that results in an acceptable overall static factor of safety for a gas pressure relief system with a series of parallel trenches or strip drains at regular spacing. The modified design methodology by Geosyntec adopts the original design concepts and basic equations, but considers a gas pressure relief system with a series of passive LFG extraction vents.

The Geosyntec-modified equations for estimating: (i) the gas pore pressure underneath final cover geomembrane; (ii) the intrinsic permeability of the gas collection and conveying layer (GCCL); (iii) the coefficient of permeability to LFG for GCCL; and (iv) the gas transmissivity of the GCCL are give below in Equations 1 through 4, respectively:

$$u_{g-\max} = \frac{\Phi_g \gamma_g}{2\psi_g}\left(D^2 \ln D - \frac{D^2}{2} - D^2 \ln a + \frac{a^2}{2}\right) \quad \text{.....................Equation 1}$$

where: $u_{g\text{-}max}$= maximum gas pore pressure acting on bottom of geomembrane (Pa);

Φ_g = gas flux from landfill surface ($m^3/s/m^2$)

γ_g = unit weight of gas (N/m^3);

Ψ_g = gas transmissivity of GCCL (e.g., soil, waste, or geosynthetic) ($m^3/s/m^2$);

D = radius of coverage of the vent (m); and

a = radius of vent.

$$k_s = \frac{K_{water}\mu_w}{\rho_w g} \quad \text{.................... ....Equation 2}$$

where: k_s = the intrinsic permeability of GCCL (m^2);

K_{water}= coefficient of permeability of GCCL to water (m/s);

μ_w = dynamic (absolute) viscosity of water (N-s/m^2)
ρ_w = unit density of water (kg/m^3); and
g = gravitational constant (m/s^2).

$$K_{gas} = \frac{k_s \rho_g g}{\mu_g} \quad \text{.......... Equation 3}$$

where: K_{gas} = coefficient of permeability of GCCL to LFG (m/s);
ρ_g = unit density of LFG (kg/m^3); and
μ_g = dynamic (absolute) viscosity of gas (N-s/m^2).

$$\psi_g = K_{gas} t \quad \text{.......... Equation 4}$$

where: t = the thickness of the GCCL (m).

The analysis is performed following the steps described below.

1. Estimate the coefficient of permeability to water for GCCL (K_{water}). If a geocomposite drainage layer (geotextile/geonet/geotextile) is used as a GCCL, an overall reduction factor may be applied to consider the reduction of the flow capacity due to various factors such as delayed intrusion, creep, and biological clogging etc.

2. Calculate the intrinsic permeability, k_s, of the GCCL using Equation 2.

3. Calculate the coefficient of permeability to LFG for the GCCL (K_{gas}) using Equation3.

4. Calculate the LFG transmissivity of the GCCL using Equation 4.

5. Calculate the LFG flux, Φ_{gas}, by dividing the LFG average annual emission rate (AAER) for the whole landfill (defined as the total annual LFG volume generated during one year) by the footprint area of the landfill. If necessary, the LFG AAER may need to be adjusted for specific landfill areas where the waste thickness is different.

6. Calculate the maximum allowable LFG pressure, $u_{gas\text{-}allow}$, for the slope stability analysis with an acceptable factor of safety (e.g., 1.5).

7. Calculate the maximum LFG pressure, $u_{gas\text{-}max}$, within a circular effective influence area of a passive LFG extraction vent for a trial radius D. Using trial and error, estimate the ROI of the LFG extraction vent as the radius D that will yield $u_{gas\text{-}max}$ equal to $u_{gas\text{-}allow}$.

LFG Emission Rate Adjustment for Waste Thickness

As mentioned in Step 5 above, the LFG flux, Φ_{gas}, may be calculated as LFG AAER divided by the footprint area of the landfill. The LFG annual total volume, which is used to calculate the LFG AAER, can be estimated using the United States Environmental Protection Agency (U.S. EPA) Landfill Air Emissions Estimation Model [U.S. EPA, 1998]. The U.S. EPA Model, as presented in detail in a calculation package titled "*MIG/De Wane Landfill, Boone County, IL LandGEM Analysis*" (referred to as the *LFG Emission Calculation Package*), is described by the following equation:

$$V_i = 2\sum_{i=1}^{n} kL_o M_i \exp(-kt_i) \quad \text{.........Equation 5}$$

where V_i is the volume of LFG generated in year i, k is the methane generation rate (1/time), L_o is the methane generation potential (volume of methane/weight of refuse); M_i is the refuse weight placed in i^{th} year; and t_i is the refuse age.

Using this approach, the calculated LFG AAER is assumed constant within the footprint of the landfill. In reality, however, the LFG emission rate will be different for different areas of the landfill. For example, the LFG emission rate near the landfill perimeter is typically much less than the LFG emission rate from the center of the landfill. This is mainly because the waste volume (or thickness) near the landfill perimeter is much less than the waste volume (or thickness) at the center of the landfill. According to the *LFG Emission Calculation Package*, the methane generation rate (k) and the methane generation potential (L_o) were assumed to be constant. Therefore, for any given year, the annual LFG volume (V_i) is directly proportional to the waste weight (M_i). Because the unit weight of the waste was assumed to be constant in the *LFG Emission Calculation Package*, the annual LFG volume (V_i) is directly proportional to the waste thickness.

For this project, the LFG emission rate will be calculated for two landfill areas, the landfill side slope area and the landfill top deck area using the procedure described below:

1. Divide the entire landfill footprint area (A_{total}) into two parcel areas, the landfill top deck area (A_{deck}) and the landfill side slope area ($A_{side} = A_{total} - A_{deck}$).

2. Calculate the average waste thickness for the entire landfill (H_{avg}) by dividing the total waste volume (V_{total}) by the entire landfill footprint area (A_{total}).

3. Estimate the waste volume occupied in the landfill top deck area (V_{deck}) using AutoCAD. The waste volume occupied in the landfill side slope area can be estimated as $V_{side} = V_{total} - V_{deck}$.

4. Calculate the average waste thickness for the landfill side slope area (H_{side}) as $H_{side} = V_{side} / A_{side}$. Calculate the average waste thickness for the landfill top deck area (H_{deck}) as $H_{deck} = V_{deck} / A_{deck}$.

5. The LFG emission rate for the side slope area (ER_{side}) can be calculated as ER_{side} = AAER x (H_{side} / H_{avg}). The LFG emission rate for the top deck area (ER_{deck}) can be calculated as ER_{deck} = AAER x (H_{deck} / H_{avg}).

ANALYSIS SCENARIO

The analyses will be performed for two different landfill areas, the side slope area and the top deck area. The final cover slope grades range from approximately 15% to 25% for the landfill side slope area, and approximately 3% to 4% for the landfill top deck area. For the purpose of this calculation package, the analyses will be performed for three slope grades (15%, 20% and 25%) in the landfill side slope area, and two slope grades (3% and 4%) in the landfill top deck area.

It is anticipated that the perforated length of the LFG vents will range from approximately 4 ft to 30 ft in the landfill side slope area and 10 ft to 30 ft in the landfill top deck area. For the purpose of this calculation package, the analyses will be performed at an increment of 2 ft for both landfill areas.

GAS COLLECTION AND CONVEYING LAYER

The final cover system for the MIG/De Wane Landfill consists of the following components, from top to bottom: (i) a 6-inch thick top soil layer; (ii) a 24-inch thick protective soil layer; (iii) a double-sided geocomposite layer; (iv) a 40-mil thick linear low density polyethylene (LLDPE) textured geomembrane layer; and (v) a 12-inch thick silty clay foundation layer with maximum hydraulic conductivity of 1 x 10^{-5} cm/s. For the purpose of this calculation package, the waste with hydraulic conductivity on the order of 1 x 10^{-3} cm/s is conservatively assumed to be directly underneath the 12-inch thick foundation layer.

Because the hydraulic conductivity of the waste is significantly more permeable than the silty clay foundation layer, LFG will flow in the waste towards the gas vents. For this analysis, the waste is assumed to collect and convey the LFG towards the gas vents and is considered to be the GCCL. The thickness of the GCCL is assumed to be equal to the perforated length of the gas vent.

It is further conservatively assumed that LFG is able to flow vertically through the final cover silty clay foundation layer to the bottom of the geomembrane layer and transfer its pressure to the interface between the geomembrane and the silty clay foundation layer. Therefore, the maximum allowable LFG pressure ($u_{gas\text{-}allow}$) will be conservatively calculated at the textured geomembrane/silty clay foundation layer.

INPUT PARAMETERS

Waste Properties

The hydraulic conductivity of the waste is calculated to be 1.4 x 10^{-3} cm/s as the log-average value based on six leachate well slug testing results as shown in Table 1 below.

Table 1. Summary of Leachate Well Slug Test Results

	k	log(k)	
LP-01-1	1.5E-03	-2.82	
LP-01-2	1.2E-03	-2.92	
LP-01-3	5.3E-04	-3.28	
LP-02-3	4.9E-04	-3.31	
LP-04-1	3.9E-03	-2.41	
LP-04-2	4.9E-03	-2.31	
	avg log (k) =	-2.84	
	avg k =	**1.4E-03**	cm/s

According to Table 2, the mass density of LFG was assumed to be 1.31 kg/m^3 or 1.31 g/cm^3, and the dynamic (absolute) viscosity of LFG was assumed to be 1.32 x 10^{-5} N-s/m^2.

Table 2. Fluid Density and Viscosities [After Thiel, 1998]

Fluid	Density ρ (kg/m^3)	Unit weight γ (N/m^3)	Dynamic viscosity μ (N-s/m^2 or kg/(s-m))	Kinematic viscosity $\nu = \mu/\rho$ (m^2/s)
Water	9.99×10^2	9.80×10^3	1.01×10^{-3}	1.01×10^{-6}
Air	1.20×10^0	1.18×10^1	1.79×10^{-5}	1.48×10^{-5}
Carbon dioxide, CO_2	1.83×10^0	1.79×10^1	1.50×10^{-5}	8.21×10^{-6}
Methane, CH_4	6.66×10^{-1}	6.54×10^0	1.10×10^{-5}	1.65×10^{-5}
LFG: 55% CO_2 45% CH_4	1.31×10^0	1.28×10^1	1.32×10^{-5}	1.01×10^{-5}

Notes: Values for landfill gas (LFG) were assumed to be prorated as having the properties of 55% carbon dioxide and 45% methane. This ratio was used to match the LFG characteristics for the Coffin Butte case history, which may be different than other landfills. Values are at standard temperature and pressure.

LFG Emission Rate

Assuming that the LFG extraction vents will be installed in 2007, the total LFG volume for Year 2007 was obtained from the *LFG Emission Calculation Package* to be 6.35 x 10^6 m^3. The AAER was estimated as 6.35 x 10^6 m^3/ (365 x 24 x 60) mins to be 12.1 m^3/min or 427 standard cubic feet per minute (SCFM). As shown in Appendix A, the two ratios, H_{side}/H_{avg} and H_{deck}/H_{avg}, required to estimate the LFG emission rates for landfill side slope and top deck areas were estimated to be 0.707 and 1.655, respectively. In other words, the LFG emission rate for the landfill side slope area was reduced by 29.3% (100% - 70.7% = 29.3%) from the AAER, and the LFG emission rate for the landfill top deck area was increased by 65.5% from the AAER. Therefore, the LFG emission rate for the landfill side slope area was estimated to be 302 SCFM (427 x 0.707 = 302 SCFM) and the LFG emission rate for the landfill top deck area was estimated to be 706 SCFM (427 x 1.655 = 706 SCFM).

Maximum Allowable LFG Pressure

Maximum allowable LFG pressures for different final cover slopes were estimated in a calculation package titled "*Infinite Slope Calculation Package*" and the results are summarized below.

- Slope = 3%, $u_{gas\text{-}allow}$ = 14.07 kN/m^2, or 56.5 in. water column (w.c.);
- Slope = 4%, $u_{gas\text{-}allow}$ = 13.56 kN/m^2, or 54.5 in. w.c.;
- Slope = 15%, $u_{gas\text{-}allow}$ = 7.97 kN/m^2, or 32.0 in. w.c.;
- Slope = 20%, $u_{gas\text{-}allow}$ = 5.45 kN/m^2, or 21.9 in. w.c.; and
- Slope = 25%, $u_{gas\text{-}allow}$ = 2.96 kN/m^2, or 11.9 in. w.c.

Vent Size

The diameter of the LFG extraction vent was assumed to be 4" in diameter.

CALCULATIONS

A step by step hand calculations are shown in detail below for the landfill side slope area for the scenario where the vent perforation length is 4 ft and the final cover slope is 15%.

Estimate intrinsic permeability (k_s) of GCCL

- mass density of water, ρ_w = 1.0 g/cm^3
- gravitational constant g = 981 cm/s^2
- absolute viscosity of water, μ_w = 1.005E-3 Pa.sec
- $k_s = \dfrac{K_{water}\mu_w}{\rho_w g}$ = 1.4E-3 x 1.005E-3 / 1 / 981 x 10 = 1.43E-8 cm^2

Estimate k_{gas} of GCCL

- mass density of LFG, ρ_g = 1.31E-3 g/cm^3
- absolute viscosity of LFG, μ_g = 1.32E-5 Pa.sec

- $K_{gas} = \dfrac{k_s \rho_g g}{\mu_g}$ = 1.43E-8 / 1.32E-5 x 1.31E-3 x 981 / 10 = 1.40E-4 cm/s

Estimate Ψ_g of GCCL

- Thickness of GCCL, t = 4 ft = 1219 mm [because the perforated pipe length is 4 ft]
- $\psi_g = K_{gas} t$ =1.40E-4 x 1219 / 10 = 1.7E-2 cm^2/s = 1.7E-6 m^2/s

Estimate LFG Flux for Landfill Side Slope Area

- LFG Emission Rate for Landfill Side Slope Area, ER_{side} = 302 SCFM = 8.54 m^3/min
- Landfill total cover area = 2,040,272 ft^2 = 189,548 m^2
- LFG Flux for landfill side slope area, Φ_g = 8.54 / 60 / 189,548 = 7.51E-7 $m^3/s/m^2$

Estimate ROI of LFG Vent

- The maximum allowable gas pressure for a 15% slope, $u_{gas\text{-}allow}$ = 7.97 kN/m^2 = 32.0 in. w.c.
- The unit weight of LFG, $\gamma_{gas} = \rho_g$ x g = 1.31E-3 x 981 x 0.001 / 0.01^2 = 12.85 N/m^2
- The vent radius, a = 2" = 0.051m
  - o Trail 1, select a D = 30 m, $u_{g-\max} = \dfrac{\Phi_g \gamma_g}{2\psi_g}\left(D^2 \ln D - \dfrac{D^2}{2} - D^2 \ln a + \dfrac{a^2}{2}\right)$ = 7.51E-7 x 12.85 / 2 / 1.7E-6 x (30^2 x Ln(30) – 30^2/2 - 30^2 x Ln(0.051) + 0.051^2/2) = 15,004 N/m^2 = 60.3 in. w.c.; since 60.3 > 32.0, try a smaller D
  - o Trail 2, select D = 20 m, $u_{g\text{-}max}$ =24.9 in. w.c., since 24.9 < 32.0, try a larger D
  - o Trail 3, select D = 25 m, $u_{g\text{-}max}$ =40.5 in. w.c., since 40.5 > 32.0, try a smaller D
  - o Trail 4, select D = 22.5 m, $u_{g\text{-}max}$ =32.2 in. w.c., since 32.2 > 32.0, try a smaller D
  - o Trail 5, select D = 22.425 m, $u_{g\text{-}max}$ =32.0 in. w.c., since 32.0 = 32.0, ROI found, ROI = 22.425 m = 73.6 ft

RESULTS

The ROI of LFG vents in the landfill side slope and top deck areas are summarized in Tables 3 and 4 below.

Written By : Yiwen Cao Date: 3/16/07 Reviewed by: Majdi Othman Date: 3/16/07

Client: BFINA Project: MIG/De Wane Landfill Project/Proposal No.: CHE8214-300 Task No.: 303

Table 3. ROI of LFG Vent in Landfill Side Slope Area

Vent Peroation Length (ft)	Vent Dia (in.)	Slope Grade (%)	LFG Emission Rate (SCFM)	ROI (ft)
4	4	15	302	73.6
6	4	15	302	88.7
8	4	15	302	101.2
10	4	15	302	112.2
12	4	15	302	122.1
14	4	15	302	131.1
16	4	15	302	139.4
18	4	15	302	147.2
20	4	15	302	154.6
22	4	15	302	161.6
24	4	15	302	168.2
26	4	15	302	174.6
28	4	15	302	180.7
30	4	15	302	186.6
4	4	20	302	61.8
6	4	20	302	74.4
8	4	20	302	85.0
10	4	20	302	94.1
12	4	20	302	102.4
14	4	20	302	109.9
16	4	20	302	116.9
18	4	20	302	123.5
20	4	20	302	129.6
22	4	20	302	135.5
24	4	20	302	141.0
26	4	20	302	146.4
28	4	20	302	151.5
30	4	20	302	156.4
4	4	25	302	46.8
6	4	25	302	56.3
8	4	25	302	64.2
10	4	25	302	71.1
12	4	25	302	77.3
14	4	25	302	83.0
16	4	25	302	88.3
18	4	25	302	93.2
20	4	25	302	97.8
22	4	25	302	102.2
24	4	25	302	106.4
26	4	25	302	110.4
28	4	25	302	114.2
30	4	25	302	117.9

Written By : Yiwen Cao Date: 3/16/07 Reviewed by: Majdi Othman Date: 3/16/07

Client: BFINA Project: MIG/De Wane Landfill Project/Proposal No.: CHE8214-300 Task No.: 303

Table 4. ROI of LFG Vent in Landfill Top Deck Area

Vent Peroation Length (ft)	Vent Dia (in.)	Slope Grade (%)	Gas Generation Rate (SCFM)	ROI (ft)
10	4	3	706	98.5
12	4	3	706	107.1
14	4	3	706	115.0
16	4	3	706	122.4
18	4	3	706	129.2
20	4	3	706	135.6
22	4	3	706	141.8
24	4	3	706	147.6
26	4	3	706	153.2
28	4	3	706	158.5
30	4	3	706	163.7
10	4	4	706	96.8
12	4	4	706	105.3
14	4	4	706	113.1
16	4	4	706	120.3
18	4	4	706	127.0
20	4	4	706	133.4
22	4	4	706	139.4
24	4	4	706	145.1
26	4	4	706	150.6
28	4	4	706	155.9
30	4	4	706	160.9

REFERENCES

Thiel, R.S., "*Design Methodology For a Gas Pressure Relief Layer Below a Geomembrane Landfill Cover to Improve Slope Stability*", Geosynthetics International, No. 6, Vol. 5, 1998.

USEPA, *Compilation of Air Pollutant Emission Factors,* "Section 2.4: Municipal Solid Waste Landfills", Document AP-42, Fifth Edition, Supplement E, November 1998.

APPENDIX A

Waste Thickness for Landfill Top Deck and Side slope Areas

Written By : Yiwen Cao Date: 3/16/07 Reviewed by: Majdi Othman Date: 3/16/07

Client: BFINA Project: MIG/De Wane Landfill Project/Proposal No.: CHE8214-300 Task No.: 303

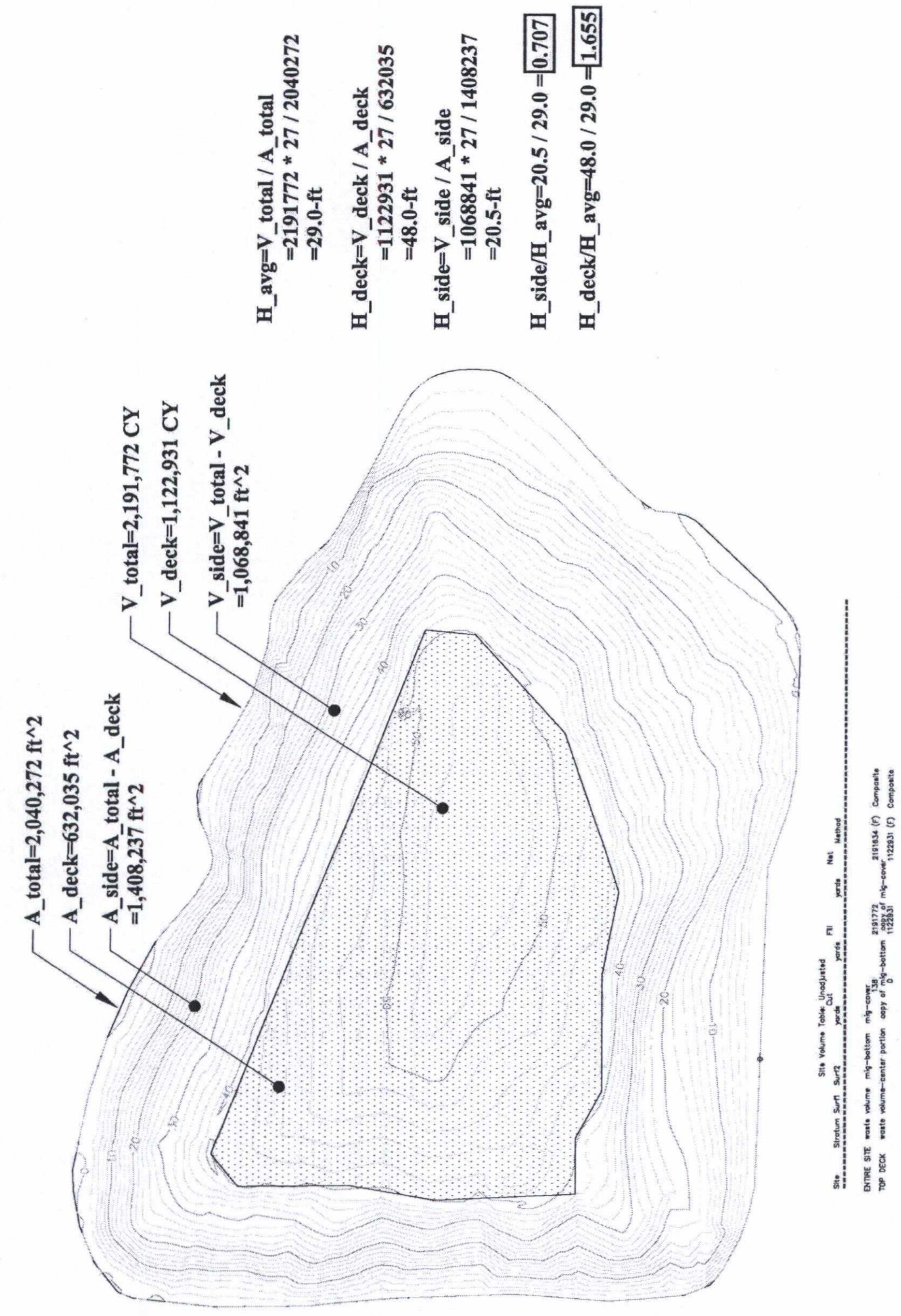


Figure 1. Waste Isopach

COMPUTATION COVER SHEET

Client: ________ Project: **MIG/DeWane Landfill** Project/ Proposal No.: **CHE8214** Task No. **302**

Title of Computations **GCCS Head Loss Calculation – 10 Well GCCS**

Computations by:	Signature		
	Printed Name	John Hargrove	Date
	Title	Senior Project Professional	4/23/07
Assumptions and Procedures Checked by: (peer reviewer)	Signature		
	Printed Name		Date
	Title		
Computations Checked by:	Signature		
	Printed Name		Date
	Title		
Computations back checked by: (originator)	Signature		
	Printed Name		Date
	Title		
Approved by: (pm or designate)	Signature		
	Printed Name	John Seymour, PE	Date 4/23/2007
	Title	Associate	

Approval notes: ______________________

Revisions (number and initial all revisions)

No.	Sheet	Date	By	Checked by	Approval

MIG DEWANE LANDFILL
GCCS HEAD LOSS CALCULATION – 10 WELL GCCS

PURPOSE

The purpose of this calculation package is to evaluate the potential head loss in header and lateral vacuum pipes connected to a gas collection and control system (GCCS) comprised of ten vertical extraction wells using the existing blower/flare skid location at the site.

ASSUMED CONDITIONS

1. From the blower/flare skid, the GCCS consists of a 4,282-ft long, 8-in. diameter SDR 17 HDPE header. Ten lateral lines, all made of 6-in. diameter, SDR 17 HDPE, will connect from the header line to 10 vertical gas extraction wells. Figure D3-1 shows the layout of the potential GCCS.

2. The existing blower is an Aerovent Series 14 centrifugal blower (Model No. 21/10-HPB-3500-20). Blower performance information is attached. The blower is rated at 2,000 scfm at 30.2 inches of water vacuum and is adequate to provide the required vacuum and gas extraction rates to a 10-well GCCS.

3. The vacuum to be applied to the farthest well from the blower, EW-10, is assumed at 5 in. H_2O.

4. The gas recovery rate from nine of the wells is 20 scfm. The gas recovery from one of the shallower wells is 10 scfm.

5. Starting at EW-10 and working back toward the blower, the head loss in the pipes is computed. Head loss is computed using attached spreadsheet. This spreadsheet uses the Hazen-Williams equation for calculation of head loss in pipe.

   The Hazen-Williams formula for calculating head loss in pipes and tubes due to friction can be expressed as:

   $P_d = 4.52\ q^{1.85} / (c^{1.85}\ d_h^{4.8655})$ (1)

   where:

   P_d = pressure drop (psi/ft pipe)

   c = design coefficient determined for the type of pipe or tube (the higher the factor, the smoother the pipe or tube). For the HDPE header and lateral pipe, the recommended c value is 150.

q = flow rate (gpm)

d_h = inside hydraulic diameter (inch)

6. The computed required blower vacuum minus the 5 in. H_2O vacuum at EW-10 equals the friction loss in the pipe.

RESULT

For a factor of safety of 1.0, the required vacuum at blower is 6.5 in H_2O. Therefore, head loss in this pipe system is 1.5 inches of H_2O. Applying a factor of safety of 1.25 to the computed required blower vacuum results in a required design blower capacity of 8.1 in H_2O.

CONCLUSION

The existing blower on Site is capable of achieving the minimum gas extraction rates and minimum vacuums when connected to the 10-well GCCS examined for this calculation package.

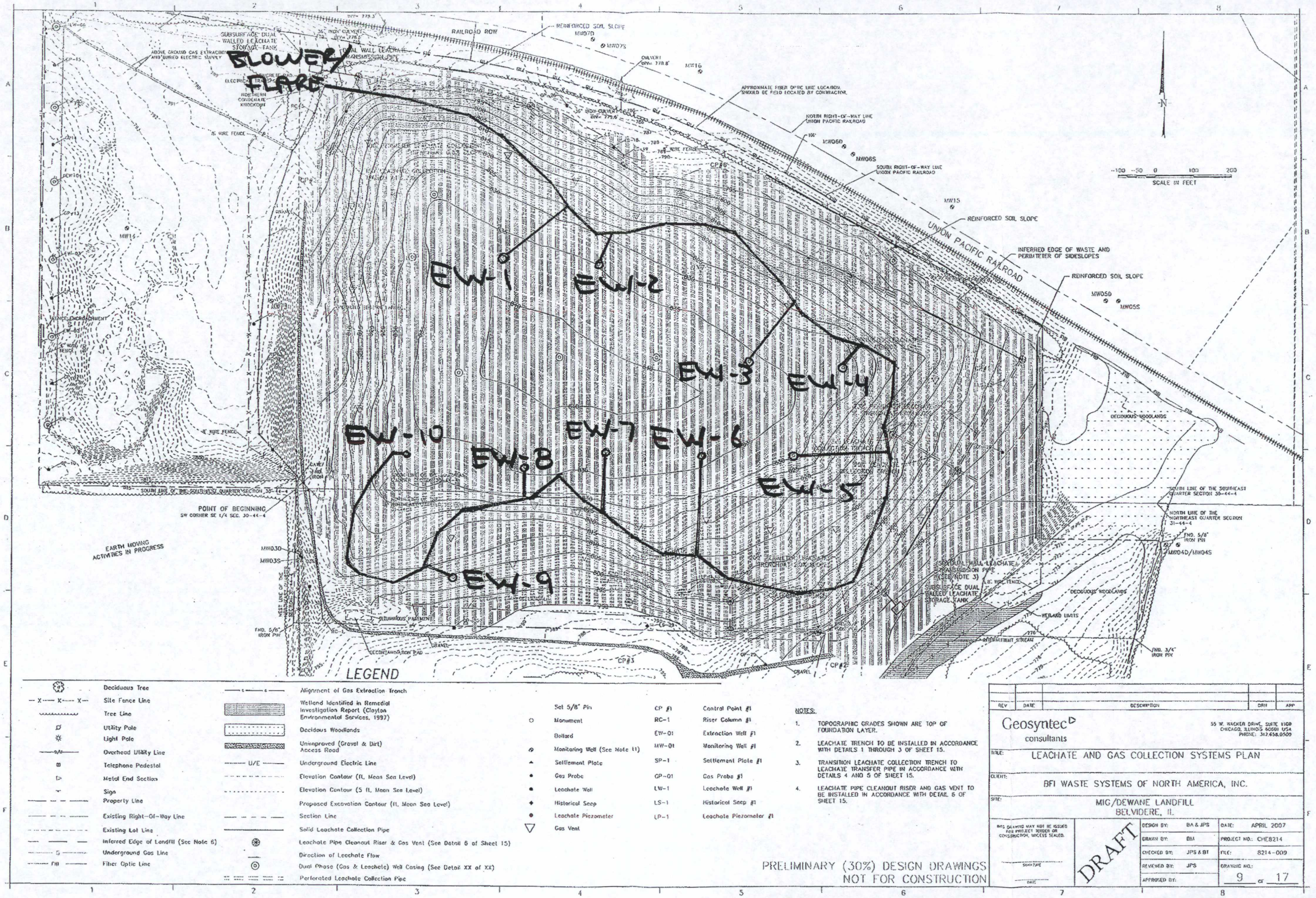


FIGURE D3-1: CALCULATION OF GCCS HEAD LOSS

MIG/DeWane Landfill - Belvidere, IL

LFG Extraction System Blower Sizing Calculations

Date: April 23, 2007

Revised Date:

Prepared By: J. Hargrove

Checked By:

ESTIMATED LFG TEMP (^{o}F): 100

RELATIVE HDPE PIPE SIZES (SDR 17)					
NOM. PIPE DIA (in):	3	10	12	14	16
PIPE I.D. (in):	3.063	9.410	11.160	12.253	14.005

SYSTEM SEGMENT	INITIAL POINT	SEGMENT DESCRIPTION	PERF. LENGTH (Ft.)	MAX. LFG FLOW (SCFM)	VACUUM AT SEGMENT BEGINNING (Inches W.C.)	LINE FLOW (SCFM)	LINE FLOW (ACFM)	NOM. LINE SIZE (In.)	LINE I.D. (In.)	PRESSURE DROP PER 100' OF PIPE (Inches W.C.)	EQUIVALENT PIPE LENGTH OF FITTINGS (Ft.)	LINE LENGTH (Ft.)	TOTAL PRESSURE DROP (Inches W.C.)	VACUUM AT SEGMENT END (Inches W.C)	GAS VELOCITY (Ft./s)	REQUIRED PIPELINE FITTINGS: FITTING	ELB (90)	TEE (RUN)	TEE (BRANCH)	BUTT VALVE	INCREASER/ REDUCER
																EQ. LENGTH (DIAMETERS):	30	20	50	40	7
EW-10 to Lateral to EW-9	EW-10	EW-10 to Perimeter header	0	20	5.0	20	21	6	5.798	0.01	45.4	36	0.00	5.0	2.0		1		1		2
	Lateral to EW-10	Lateral to EW-10 to Lateral to EW-9		20	5.0	20	21	8	7.550	0.00	44.0	550	0.01	5.0	1.2			1	1		
EW-9 to Header	EW-9	EW-9 to Header	0	10	5.0	10	11	6	5.798	0.00	45.4	77	0.00	5.0	1.0		1		1		2
					5.0	10	11	6	5.798	0.00	0.0	0	0.00	5.0	1.0						
Header between EW-9 and EW-8	Lateral to EW-9	Lateral to EW-9 to Lateral to EW-8	0	30	5.0	30	32	8	7.550	0.00	12.6	350	0.01	5.0	1.7			1			
					5.0	30	32	8	7.550	0.00	0.0	0	0.00	5.0	1.7						
EW-8 to Header	EW-8	Lateral from EW-8 to header	0	20	5.0	20	21	6	5.798	0.01	45.4	77	0.01	5.0	2.0		1		1		2
					5.0	20	21	6	5.798	0.01	0.0	0	0.00	5.0	2.0						
Header between EW-8 and EW-7	Lateral to EW-8	Lateral to EW-8 to Lateral to EW-7	0	50	5.0	50	54	8	7.550	0.01	37.8	266	0.02	5.0	2.9			1		1	
					5.0	50	54	8	7.550	0.01	0.0	0	0.00	5.0	2.9						
EW-7 to Header	EW-7	Lateral from EW-7 to header	0	20	5.0	20	21	6	5.798	0.01	45.4	159	0.01	5.0	2.0		1		1		2
					5.0	20	21	6	5.798	0.01	0.0	0	0.00	5.0	2.0						
Header between EW-7 and EW-6	Lateral to EW-7	Lateral to EW-7 to Lateral to EW-6	0	70	5.0	70	75	8	7.550	0.01	12.6	277	0.04	5.0	4.0			1			
					5.0	70	75	8	7.550	0.01	0.0	0	0.00	5.0	4.0						
EW-6 to Header	EW-6	Lateral from EW-6 to header	0	20	5.0	20	21	6	5.798	0.01	45.4	264	0.02	5.0	2.0		1		1		2
					5.0	20	21	6	5.798	0.01	0.0	0	0.00	5.0	2.0						
Header between EW-6 and EW-5	Lateral to EW-6	Lateral to EW-6 to Lateral to EW-5	0	90	5.0	90	97	8	7.550	0.02	44.0	793	0.19	5.2	5.2			1	1		
					5.2	20	21	8	7.550	0.00	0.0	0	0.00	5.2	1.2						
EW-5 to Header	EW-5	Lateral from EW-5 to header	0	20	5.2	20	21	6	5.798	0.01	45.4	255	0.02	5.2	2.0		1		1		2
					5.2	20	21	6	5.798	0.01	0.0	0	0.00	5.2	2.0						
Header between EW-5 and EW-4	Lateral to EW-5	Lateral to EW-5 to Lateral to EW-4	0	110	5.2	110	118	8	7.550	0.03	12.6	336	0.11	5.3	6.3			1			
					5.3	110	118	8	7.550	0.03	0.0	0	0.00	5.3	6.3						
EW-4 to Header	EW-4	Lateral from EW-4 to header	0	20	5.3	20	21	6	5.798	0.01	45.4	77	0.01	5.3	2.0		1		1		2
					5.3	20	21	6	5.798	0.01	0.0	0	0.00	5.3	2.0						
Header between EW-4 and EW-3	Lateral to EW-4	Lateral to EW-4 to Lateral to EW-3	0	130	5.3	130	140	8	7.550	0.04	37.8	214	0.11	5.4	7.5			1		1	
					5.4	130	140	8	7.550	0.04	0.0	0	0.00	5.4	7.5						
EW-3 to Header	EW-3	Lateral from EW-3 to header	0	20	5.4	20	21	6	5.798	0.01	45.4	195	0.01	5.4	2.0		1		1		2
					5.4	20	21	6	5.798	0.01	0.0	0	0.00	5.4	2.0						
Header between EW-3 and EW-2	Lateral to EW-3	Lateral to EW-3 to Lateral to EW-2	0	150	5.4	150	161	8	7.550	0.06	44.0	573	0.34	5.7	8.6			1	1		
					5.7	150	161	8	7.550	0.06	0.0	0	0.00	5.7	8.7						
EW-2 to Header	EW-2	Lateral from EW-2 to header	0	20	5.7	20	22	6	5.798	0.01	45.4	91	0.01	5.7	2.0		1		1		2
					5.7	20	22	6	5.798	0.01	0.0	0	0.00	5.7	2.0						

MIG/DeWane Landfill - Belvidere, IL

LFG Extraction System Blower Sizing Calculations

Date: April 23, 2007

Revised Date:

Prepared By: J. Hargrove

Checked By:

ESTIMATED LFG TEMP (^{o}F): 100

RELATIVE HDPE PIPE SIZES (SDR 17)					
NOM. PIPE DIA (in):	3	10	12	14	16
PIPE I.D. (in):	3.063	9.410	11.160	12.253	14.005

SYSTEM SEGMENT	INITIAL POINT	SEGMENT DESCRIPTION	PERF. LENGTH (Ft.)	MAX. LFG FLOW (SCFM)	VACUUM AT SEGMENT BEGINNING (Inches W.C.)	LINE FLOW (SCFM)	LINE FLOW (ACFM)	NOM. LINE SIZE (In.)	LINE I.D. (In.)	PRESSURE DROP PER 100' OF PIPE (Inches W.C.)	EQUIVALENT PIPE LENGTH OF FITTINGS (Ft.)	LINE LENGTH (Ft.)	TOTAL PRESSURE DROP (Inches W.C.)	VACUUM AT SEGMENT END (Inches W.C)	GAS VELOCITY (Ft./s)	REQUIRED PIPELINE FITTINGS: FITTING	ELB (90)	TEE (RUN)	TEE (BRANCH)	BUTT VALVE	INCREASER/ REDUCER
																EQ. LENGTH (DIAMETERS):	30	20	50	40	7
Header between EW-2 and EW-1	Lateral to EW-2	Lateral to EW-2 to Lateral to EW-1	0	170	5.7	170	183	8	7.550	0.07	37.8	155	0.13	5.8	9.8			1		1	
					5.8	170	183	8	7.550	0.07	0.0	0	0.00	5.8	9.8						
EW-1 to Header	EW-1	Lateral from EW-1 to header	0	20	5.8	20	22	6	5.798	0.01	45.4	214	0.02	5.8	2.0		1		1		2
					5.8	20	22	6	5.798	0.01	0.0	0	0.00	5.8	2.0						
Header from EW-1 to Blower	Lateral to EW-1	Lateral to EW-1 to Blower	0	190	5.8	190	204	8	7.550	0.08	44.0	768	0.68	6.5	11.0			1	1		
					6.5	190	205	8	7.550	0.08	0.0	0	0.00	6.5	11.0						
K.O. POT INLET	K.O. POT INLET	K.O. POT INLET HEADER TO K.O. POT INLET			6.5	20	22	12	11.160	0.00	0.0		0.00	6.5	0.5						
BLOWER INLET HEADER	K.O. POT OUTLET	K.O. POT OUTLET TO BLOWER INLET RISER			6.5	20	22	12	11.160	0.00	0.0		0.00	6.5	0.5						
BLOWER INLET RISER	BLOWER INLET HEADER	BLOWER INLET HEADER TO BLOWER INLET			6.5	20	22	12	11.160	0.00	0.0		0.00	6.5	0.5						
BLOWER OUTLET RISER	BLOWER OUTLET	BLOWER OUTLET TO BLOWER OUTLET HEADER			5.0	20	21	12	11.160	0.00	0.0		0.00	5.0	0.5						
BLOWER OUTLET HEADER	BLOWER OUTLET RISER	BLOWER OUTLET RISER TO FLARE INLET			5.0	20	21	12	11.160	0.00	0.0		0.00	5.0	0.5						
												TOTAL DROP	1.75								

Notes:

1. Required Available Flare Capacity = Not required
2. Required Blower Capacity = 1 @ _11,400_ $Ft.^3$/hour
3. Blower Inlet Vacuum Required = Calculated Friction Losses * 1.25 Safety Factor
   Blower Inlet Vacuum Required = _6.5_ In. W.C. * 1.25 = _8.1_ In. W.C., Say _10_ In. W.C.
4. Blower Outlet Pressure Required = Calculated Friction Losses
   Blower Outlet Pressure Required = _____ In. W.C., Say ____ In. W.C.
5. Internal pressure drop through the flare is (NA) in. W.C. (from flare manufacturer) plus (NA) In. W.C. for flame arrestors (assumed).

APPENDIX F

Stormwater Evaluation

HYDROLOGIC/HYDRAULIC ANALYSIS OF STORMWATER MANAGEMENT

MIG / DEWANE LANDFILL
BELVIDERE, BOONE COUNTY, ILLINOIS

Prepared:

April 18, 2014

TABLE OF CONTENTS

ATTACHMENTS

1. Reference Documentation
   NOAA Rainfall Point Precipitation Frequency Estimates
   TR-55 Curve Number Chart
   TR-55 Sheet Flow Velocity Chart
2. Drainage Area Exhibits
3. Time of Concentration calculations
4. Pond Stage Storage Tables
5. HEC-HMS input and output summary
6. Conveyance feature design calculations (swales & channels)
7. Conveyance feature design calculations (culverts)
8. Flow vs Area rating curve and table

Written by:	ACV	Date:	14 04 10 (YY MM DD)	Reviewed by:	MRB	Date:	14 04 17 (YY MM DD)
Client:	Republic	Project:	MIG / DeWane landfill	Project/Proposal No.:	CHE8214	Task No:	

HYDROLOGIC/HYDRAULIC ANALYSIS OF STORMWATER MANAGEMENT

INTRODUCTION

The purpose of this calculation package is to present the hydrologic/hydraulic analysis for the estimation of storm water runoff and discharge from the MIG / DeWane landfill for the Modified Remedy conditions, which consist of regrading and placement of additional cover for the landfill cap. The specific goals of the analysis include calculating peak discharge of stormwater from the site via drainage features to stormwater management basins for the proposed conditions, comparing proposed conditions to existing conditions, design of stormwater detention basins, and the design of conveyance structures (culverts, swales and drainageways). This calculation package addresses the peak flow, peak velocity, and peak depth of water in drainage features that are necessary for the design of the landfill modifications, to demonstrate that these features are adequately sized.

REGULATORY CRITERIA

The Boone County, Illinois Code of Ordinances, Section 508 contains regulations for stormwater management for development activities in Boone County. The intent of these regulations is to provide detention storage of stormwater where necessary to eliminate the excessive stormwater runoff caused by site development or modifications.

Specifically, the Ordinance limits the 100-year peak discharge rate from areas of new development to 0.2 cubic feet per second per acre (cfs/acre).

The MIG/DeWane landfill cover modification project is not a land development project that will add impervious area. Modifications are being made to add material to the existing clay cover of the landfill, and perform grading to better manage local surface runoff. Even without stormwater detention, it is not anticipated that 100-year peak outflows from the landfill site would increase after the project is implemented, as compared to the current site conditions. In order to provide proper stormwater management per county ordinance, stormwater detention will be implemented where feasible to achieve a 0.2 cfs/acre outflow rate limit for the 100-year design storm, based on County criteria.

BASIS OF DESIGN

Stormwater detention facilities have been designed to manage the 100-year peak discharge from tributary landfill areas to 0.2 cfs per acre or less. Pond 1, in the northwest corner of the site, also receives stormwater inflow from an upstream offsite residential area. Peak flows from this offsite area have not been reduced to 0.2 cfs per acre, but are passed through the stormwater detention basin at their existing rate.

Table 1 shows how the allowable peak discharge rates for Ponds 2, 3 and 4 were determined, using the allowable rate of 0.2 cfs per acre for all tributary areas for the 100-year design storm. Table 2 shows how the allowable peak discharge rate for Pond 1 was calculated, which has the upstream residential developed area that is not required to be reduced to the 0.2 cfs per acre.

Table 1
Allowable discharge rate for 100-year storm for Ponds 2, 3, 4

Pond / drainage basin	Drainage area (acres)	Allowable 100-year peak outflow rate (cfs)
Pond 2 (Southwest)	20.7	4.14
Pond 3 (Southeast)	5.87	1.17
Pond 4 (East)	8.45	1.69

Table 2
Allowable discharge rate for 100-year storm for Pond 1 (Northwest Pond)

Contributing area description	Drainage area (acres)	Allowable 100-year peak outflow rate (cfs)	Comments
Onsite area (landfill, pond, borrow pit)	29.7	5.93	Allowable 100-year discharge is drainage area (acres) x 0.2 cfs per acre
Offsite residential area	0.98	4.7	Offsite area so allowable peak discharge rate equal to existing 100-year peak rate from this area
Total	**30.7**	**10.63**	**Total allowable 100-year peak outflow is sum of previous two rows**

Some areas on the fringes of the landfill site have topography that makes it infeasible to provide local stormwater detention or to construct drainage features that can route the water to planned stormwater detention facilities. For example, on the north side of the landfill adjacent to railroad right-of-way, there is an area along the toe of the landfill slope from which runoff cannot be conveyed to any of the planned stormwater detention facilities, because of the elevation of this area relative to the elevation of the stormwater facilities, and the distance between them. Because of topography, local detention at this location cannot be constructed either. This area will drain directly offsite, but no increase in peak outflow is expected because no impervious area is being added and the horizontal extent of clay landfill cover is not being modified. Modeling and calculations presented in this report show that even with some fringe areas that drain directly offsite, overall there will be a substantial reduction in peak flow rates from the site compared to existing conditions, as a result of the four stormwater detention basins that will be constructed.

Conveyance features such as drainage benches, downchutes and culverts have been sized to adequately convey the peak tributary flow for the 100-year design storm.

METHOD OF ANALYSIS

The watershed analysis was performed using procedures described in the documents, "Urban Hydrology for Small Watersheds, Technical Release 55", (USDA-SCS, 1986). The computer program HEC-HMS was used to perform the hydrologic analysis. The computer program HY-8 was used to perform the hydraulic analysis of the culverts. Microsoft Excel ® spreadsheets were developed to perform several of the other supporting calculations, such as time of concentration, pond stage-storage, and swale conveyance capacity.

ANALYZED CONDITIONS

HEC-HMS was used to determine the stormwater volume and peak flows that must be conveyed and detained for post-project conditions. A HEC-HMS model was also developed to estimate peak flows under existing conditions.

Existing Condition:

For existing conditions, a HEC-HMS model was developed to simulate total existing peak flow rates from the site. The site was divided into two drainage areas: an area that flows north to the existing railroad right of way, and an area that flows south and east to existing wetland areas. Two drainage areas were delineated to demonstrate that the overall peak flows from the site will decrease, as well as the peak flows in each offsite drainage direction.

HEC-HMS model input such as curve numbers were based on existing land covers, consisting of landfill area, other open space, and offsite residential lots.

This information was used to analyze and compare the existing condition peak flows to the peak flows in the proposed condition. As will be shown quantitatively, the peak flows in the proposed condition will be less than in existing conditions.

Post-Project Condition:

A HEC-HMS model of post-project conditions was constructed, with proposed drainage areas based on the final grading plan. Four stormwater management facilities – wet bottom detention ponds – will be used to manage peak runoff rates from the site. The HEC-HMS model includes the drainage area to each pond, and simulations of the performance of each pond. The model also includes drainage areas that represent the small areas on the fringes of the site that cannot be routed to a detention pond. Adding the peak discharge rates from these areas to the outflows from the ponds allows the overall peak runoff rates discharges from the site to be calculated, and compared to existing conditions.

Another HEC-HMS model was created to simulate peak flows for select individual drainage areas that represent areas tributary to major downchutes, drainage benches and culverts. 100-year peak flow rates from these drainage areas were used to analyze the hydraulic capacity of proposed upland drainage features.

For smaller conveyance features such as local drainage benches, peak flows were calculated using a unit drainage area approach. A HEC-HMS model was used to determine a linear relationship between drainage area and peak flow for the 100-year design storm. The measured drainage area to a conveyance feature could then be used to estimate a design flow.

HEC-HMS input and output is presented in Attachment 5.

PARAMETERS USED IN ANALYSIS

The following describes the selection of the various hydrologic parameters used for watershed analysis.

- **Rainfall Distribution and Depth**: Based on precipitation data from the *"Precipitation-Frequency Atlas of the United States"*, (NOAA National Weather Service, 2011, http://hdsc.nws.noaa.gov/hdsc/pdfs/); the 24-hour precipitation magnitudes for the 100-year return period is used in the hydrologic analyses (see Attachment 1). The 100-year return period, 24-hour duration design rainfall depth is 6.69 inches.

- **Curve Number (CN):**

  Existing and Proposed Landfill Cover Areas: The ground surface of the landfill area consists of established vegetation and topsoil over a clay cover. This landfill has long been closed, and there are no working/exposed areas of landfill. A curve number (CN) of 89 was selected to represent landfill areas, for both existing and post-project conditions. This is based on the entry for "Open space, poor cover condition, Hydrologic Soil Group D (heavy clay soils)" in the TR-55 curve number reference table. Although a good vegetation cover will be established for long-term post-project conditions, using the higher curve number (which increases the simulated runoff volume) adds an additional factor of safety for the tightly compacted clay cover.

  For existing and proposed open space areas that are outside of the landfill clay cover area, a curve number of 61 was used. This represents open vegetated areas in good condition with Hydrologic Group B (fairly well drained soils). Hydrologic Soil Group B was selected based upon a review of mapped soil units at the site in the NRCS soil survey.

  For the offsite residential area on the western fringe of the drainage area, a curve number of 75 was used. This value was taken from the TR-55 curve number table for ¼ acre residential lots (confirmed by lot size measurement) and Hydrologic Group B soils.

- **Time of Concentration (*T_c*):** The T_c value represents the total time for stormwater runoff to travel from the hydraulically most distant point of a watershed or drainage area to a point of interest. Factors affecting T_c include surface roughness, channel shape, flow patterns, and slope. For this analysis the calculation of T_c evaluates the impact of three different types of stormwater runoff flow:

  - **sheet flow** – flow over plane surfaces, before runoff flow concentrated into a defined path. TR-55 allows up to 300 feet, however a variety of publications suggests using a length shorter than 300 ft. For this project, sheet flow lengths were estimated based on a review of grading and topography and estimates of where flow would begin to concentration. Typically, sheet flow lengths ranged from 100 to 200 feet.

- **shallow concentrated flow** – after a distance of 100 to 300 feet, sheet flow will begin to concentrate, but not necessarily defined in a specific channel; and
- **channel flow** – flow that is confined to a defined channel section.

The T_c value for a drainage area is the sum of the individual various travel time (T_t) values of the above flow types. The equations for calculating the T_t are presented below

- **Sheet Flow:** $$T_t = \frac{0.007\,(nL)^{0.8}}{(P_2)^{0.5}\,s^{0.4}}$$

Shallow Concentrated Flow: $$T_t = \frac{L}{3{,}600\,V}$$

- **Open Channel Flow:** $$T_t = \frac{nL}{3{,}600\,(1.49)\,r^{2/3}\,s^{1/2}}$$

where: T_t = travel time (hours);
n = Manning's roughness coefficient (dimensionless);
- n = 0.4 for woods, light underbrush
- n = 0.15 for short grass
- n = 0.05 for fallow
- n = 0.03 for open channel, earth, grass and winding
- n = 0.025 for open channel, earth, clean and straight
- n = 0.022 for slope drain, provided by manufacturer

L = length of flow (ft.);
P_2 = rainfall from a 2-year, 24-hour storm (in.);
s = Bed or surface slope in the flow direction (ft/ft);
V = velocity (ft/sec); and
r = hydraulic radius (ft.).

Hydraulic radius, r, is defined as A/P, where A is flow area and P is the wetted perimeter of the cross section.

TR-55 provides a graphical solution for T_t for shallow concentrated flow over "paved" and "unpaved areas". The "*National Engineering Handbook, Section 4 Hydrology (NEH-4)*", (SCS, 1985) provides the following equation for V:

$$V = K_v \sqrt{s}$$

where K_v is a velocity factor based on various surface conditions (i.e., paved, unpaved, grassed waterway, short grass pasture, etc.) and s is the slope of the land surface. TR-55 provides a graph of velocity factors (K_v), which are used to calculate V in the above equation. The value of K_V used for these calculations were obtain from Figure 3-1 in the TR-55 manual. The Tc calculations are presented in Attachment 3.

- **Subcatchment Drainage Areas:**

  Drainage areas were measured in AutoCAD.

  Screenshots of the hydrologic input parameters used in the HEC-HMS analysis are presented in Attachment 5.

POND DESIGN – HYDROLOGIC ANALYSIS

The primary design criteria for the hydrologic design of each stormwater pond is to provide adequate runoff storage volume, combined with the appropriate outlet structure, to restrict the pond's 100-year peak outflow rate to no more than the allowable outflow rates presented in Tables 1 and 2.

The existing topography of the site, and proposed runoff conveyance features, led to the siting of four stormwater detention ponds around the landfill site. The locations of these four proposed ponds are shown in Figure 2.

The outlet elevation and normal water level of each pond is dictated by the lowest available downstream outlet elevation that will allow the ponds to fully drain by gravity flow back to the normal water elevation. The pond bottoms are designed as wetland-type bottoms that will be vegetated with native shallow water and wetland plant species. Small pools with depths of 3 to 4 feet will be constructed at pond inlet locations and outlets to promote additional sediment settling.

The pond hydrologic design was an iterative process, using HEC-HMS to simulate design trials of pond grading concepts and outlet structures. The "bounce" in the pond's water level (depth of water during the 100-year design storm) was generally targeted to be 4 to 5 feet. Grading concepts were refined to provide the appropriate storage volumes and release rates.

HYDROLOGIC ANALYSIS RESULTS

Table 3 presents input parameters and results from HEC-HMS modeling of existing conditions. Detailed HEC-HMS input and output screenshots are presented in Attachment 5.

Written by:	ACV	Date:	14 04 10 (YY MM DD)	Reviewed by:	MRB	Date:	14 04 17 (YY MM DD)
Client:	Republic	Project:	MIG / DeWane landfill	Project/Proposal No.:	CHE8214	Task No:	

Table 3
Existing Conditions Hydrologic Modeling

Drainage basin / direction	Drainage area (acres)	Drainage area (sq miles)	Curve number	Lag time (minutes)	100-year peak flow (cfs)
North	37.6	0.0587	79	14	170
South	34.6	0.0541	81	13	170
Total	**72.2**	**0.1128**			**340**

Table 4 presents the results from HEC-HMS modeling of post-project conditions.

Table 4
Post-Project Conditions Hydrologic Modeling

Drainage basin / description	Drainage area (acres)	100-year peak outflow (cfs)
North: Outlet from Pond 1 (NW Pond)	30.6	9.0
North: Direct runoff to offsite	2.8	21.9
North total	**33.4**	**30.9**
South: Outlet from Pond 2 (SW Pond)	20.7	3.7
South: Outlet from Pond 3 (SE Pond)	5.9	1.1
South: Outlet from Pond 4 (East Pond)	8.5	1.5
South: Direct runoff to offsite, far east subbasin	0.4	3.0
South: Direct runoff to offsite, southeast subbasin	1.4	6.9
South: Direct runoff to offsite, south central subbasin	2.4	13.3
South total	**39.2**	**29.5**
Total combined	**72.6**	**60.4**

For post-project conditions, peak flows from individual ponds and drainage areas were added together to compute overall 100-year peak flows to the north, to the south, and for the overall site. This addition of peak flows may result in conservative peak flow totals because of differences in the timing of runoff peaks from different areas, so the actual post-project peak flow totals may be slightly lower than presented in Table 4.

The comparison of peak flows in Tables 3 and 4 shows that with the addition of stormwater detention, post-project peak flow rates for the 100-year design storm will be much lower than existing peak flow rates. For the north area tributary to the railroad right of way, the 100-year peak flow contribution is reduced from 170 cfs to 31 cfs. For the south area tributary to the wetlands south and east of the site, the peak flow contribution is reduced from 170 cfs to 29 cfs. For the combined site, 100-year peak flow discharges are reduced from 340 cfs to 60 cfs.

A copy of the HEC-HMS input parameters and output results are presented in Attachment 5.

Table 5 presents pond-specific results and data.

Table 5
Stormwater Pond Modeling Results

	Pond 1 (Northwest)	Pond 2 (Southwest)	Pond 3 (Southeast)	Pond 4 (East)
100-year peak inflow (cfs)	137	106	38	46
100-year peak outflow (cfs)	9.0	3.7	1.1	1.5
Allowable maximum 100-year peak outflow per ordinance (cfs)	10.6	4.1	1.2	1.7
Pond normal water elevation	787	784	776	773
100-year high water elevation	790.3	789.0	779.1	776.5
Embankment elevation	792	791	781	779
Emergency spillway elevation	791	790	780	778
100-year peak runoff storage volume (acre-feet)	6.8	6.3	1.7	2.5
100-year peak runoff storage volume (inches of runoff from drainage area)	2.7	3.7	3.5	3.5

DRAINAGE BENCH, DOWNCHUTE AND CULVERT DESIGN – HYDRAULIC ANALYSIS

The project also includes construction of stormwater conveyance features to collect runoff and route it to the stormwater detention ponds. Conveyance features include:

- Drainage benches/swales: Vegetated triangular or trapezoidal swales running perpendicular to direction of hillslope. Drainage benches are used to intercept and safely convey downslope sheet runoff, and limit the development of steep concentrated flow paths on landfill side slopes. Larger drainage benches/swales are also used at the toe of slopes to collect stormwater runoff from downchutes and route it to stormwater ponds.
- Downchutes: Steep concrete-lined runoff channels that run approximately parallel to the direction of hillslope. Downchutes are used to collect runoff from upslope drainage benches, and safely convey this runoff to lower elevations in a non-erosive manner. Given the steep slopes and concentrated flows, fabric-formed concrete linings will be used to armor the bottom and side slopes of the trapezoidal downchutes.
- Culverts are used at selected locations to convey concentrated flow under access drives.

The drainage benches, swales, downchutes and culverts are all designed to effectively convey the runoff from the 100 year, 24 hour design storm. Attachment 6 presents the hydraulic design calculations of the proposed drainage benches and downchutes. Tables 6 and 7, shown in the Hydraulic Analysis Results section below, summarize the peak flows and hydraulic design parameters of downchutes and drainage benches. Microsoft Excel spreadsheets were developed to analyze the conveyance capacity of drainage benches and downchutes.

Attachment 7 presents the hydraulic design calculations of the proposed culverts. Table 8 in the following section summarizes the peak flows to each culvert. The computer program HY-8 was used to perform the hydraulic analysis of the culverts.

For numerous smaller drainage basins tributary to smaller conveyance features, it would not be cost-effective to simulate all of these drainage basins individually in HEC-HMS. Instead, a peak flow vs. drainage area rating curve was used. This rating curve was developed by simulating a series of hypothetical subbasins with increasing drainage areas in HEC-HMS, and plotting the results (comparison of peak flows and areas). A watershed lag time of 7 minutes was assumed. This assumption leads to conservative results, because in reality the lag time will increase as drainage area size increases, leading to lower unit peak flows. A curve number of 89 was used.

It was found that drainage area and peak flow can be linearly related by the equation Peak Flow (cfs) = 7.2 x Drainage Area (acres).

HYDRAULIC ANALYSIS RESULTS

The maximum flow capacity of all downchutes, swales and culverts (as presented in Attachments 6 and 7) is greater than the estimated peak discharge from the 100 year, 24 hour design storm.

The following tables summarize the hydraulic design results of these conveyance features.

Table 6
Downchute Hydraulic Design Summary

Downchute Name/ Location	Drainage area (acres)	100-year peak flow (cfs)	Slope (%)	Flow depth (ft)	Freeboard (ft)	Flow capacity at 1.5 ft depth (cfs)
1A-1 (west)	4.1	30	7%	0.76	0.74	122
1B-1 (north)	7.7	55	14%	0.86	0.64	172
2A-1 (southwest)	8.5	61	4%	1.24	0.26	92
3-2 (southeast)	2.9	21	10%	0.58	0.92	145
4A-1 (northeast)	1.5	11	15%	0.36	1.14	178

All downchutes are designed to have a trapezoidal cross section, with a 2 foot bottom width and 2:1 side slopes. The minimum vertical distance from the downchute bottom to the top of the adjacent berm is 1.5 feet.

The hydraulics for downchutes 2B-1, 3-1, 4B-1 were not analyzed in detail. It was determined from a review of the drainage areas and slopes of these downchutes that they have combinations of smaller drainage areas (and therefore smaller design flows) and/or steeper slopes (and therefore greater hydraulic capacity) that result in these downchutes also having adequate hydraulic capacity, based on the geometric design criteria described in the preceding paragraph.

Major benches are those drainage benches which generally lie at the toe of the landfill side slopes. Because these benches receive incoming flow from downchutes or receive flow from large contributing drainage areas, they were found to have higher 100-year peak flows that necessitated the use of a trapezoidal channel section. Because of the larger drainage areas and higher peak flows of these drainage benches, hydraulic capacity calculations were performed individually for these major benches and are summarized below in Table 7.

Table 7
Major Bench Hydraulic Design Summary

Major Bench Name/ Location	Drainage area (acres)	100-year peak flow (cfs)	Slope (%)	Flow depth (ft)	Free-board (ft)	Flow capacity at 1.5 ft depth (cfs)
1B-7 (northwest)	11.1	59	1.5%	1.34	0.68*	145* (at 2 ft depth)
2A-6 (southwest)	5.8	30	1.5%	0.98	0.52	75
3-4 (southeast midlevel)	2.9	20	2%	0.88	0.62	84
3-7 (southeast low-level)	4.8	35	1.5%	0.94	0.56	103
4A-5 (east midlevel)	4.6	26	1.5%	0.90	0.60	81
4B-1 (east low-level)	3.5	25	1.5%	0.80	0.70	103

For all major benches, the cross section will be trapezoidal, with a minimum 3 foot bottom width and 3:1 or greater side slopes.
* For all major benches except for 1B-7(Northwest), the depth of the bench (from the channel bottom to the top of the downslope berm) is a minimum of 1.5 feet. For major bench 1B-7, the depth of the bench is 2 feet, to accommodate the higher design flow in this bench.

Hydraulic Analysis of Minor Drainage Benches

Drainage benches located in the upper slope and midslope region of the site have smaller tributary drainage areas and smaller 100-year peak design flows. These drainage benches are also much more numerous than the major drainage benches. Individual hydraulic analyses of all of these benches were not performed. Instead, the hydraulic performance of typical triangular (V-shaped) drainage benches was assessed for longitudinal slopes of 1.5, 2 and 3%. Attachment 6 includes the spreadsheet printouts from these analyses.

Drainage areas to minor benches were then visually assessed, and drainage basin delineations were conducted for those minor benches that appeared to have the largest drainage areas. 100-year peak flows were calculated based on the drainage area/peak flow linear relationship established in Attachment 8, or with subbasin-specific HEC-HMS models. These peak flows were then used to verify that the typical triangular drainage bench at slopes ranging from 1.5% to 3% had adequate capacity to convey design flows.

Hydraulic Analysis of Culverts

Table 8 summarizes the hydraulic design data for the major culverts. Detailed culvert modeling input and results are presented in Attachment 7.

Table 8
Culvert Design Flows and Geometric Data

	Culvert into Pond 1 (Northwest Pond) – north culvert	Culvert into Pond 1 (Northwest Pond) – south culvert	Culvert into Pond 2 (Southwest Pond)	Culvert into Pond 3 (Southeast Pond)
Drainage area (acres)	12.4	5.6	16.6	5.5
100-year peak flow (cfs)	66	41	88	37
Approximate length (ft)	180	170	70	60
Upstream invert elevation (ft)	793	806	791	780.5
Downstream invert elevation (ft)	791	791	790	780
Pipe diameter (inches)	36	36	36	36
Number of barrels	2	1	2	1
Computed upstream headwater elevation (ft)	795.92	809.23	794.78	783.6

SUMMARY AND CONCLUSIONS

Stormwater pond sizing was analyzed using HEC-HMS. Adequate pond storage volumes will be provided to reduce 100-year peak pond outflows to 0.2 cfs per acre (in accordance with the Boone County stormwater ordinance), except for the pass-through of peak flows from offsite existing development. Overall existing and post-project 100-year peak flows from the site were also simulated, and it is estimated that the series of four detention ponds will reduce the overall peak 100-year discharge from the site by over 80%.

The drainage benches, swales, downchutes and culverts have been designed to effectively convey the runoff from the 100 year, 24 hour design storm. The maximum flow capacity of all benches, swales, downchutes and culverts (as presented in Attachments 6 and 7) is greater than the estimated peak discharge from the 100 year, 24 hour design storm.

REFERENCES

NOAA National Weather Service, *"Precipitation-Frequency Atlas of the United States"* Atlas 14, Volume 2, Version 3, Silver Spring Maryland, 2004.

United States Department of Agriculture, Soil Conservation Service (USDA-SCS), *"National Engineering Handbook, Section 4 Hydrology (NEH-4)"*, National Technical Information Service, 1985.

United States Department of Agriculture, Soil Conservation Service (USDA-SCS), "*Urban Hydrology for Small Watersheds, Technical Release 55*", 2nd ed., Washington, D.C., 1986.

US Army Corps of Engineers, Hydrologic Engineering Center, "Hydrologic Modeling System HEC-HMS User's Manual," Version 3, Davis California, August 2010.

ATTACHMENTS

ATTACHMENT 1

Reference Documentation

a) NOAA Rainfall Point Precipitation Frequency Estimates
b) TR-55 Curve Number Chart
c) TR-55 Sheet Flow Velocity Chart

www.nws.noaa.gov

NOAA's National Weather Service
Hydrometeorological Design Studies Center
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- PF Documents

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- PMP Documents

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- AEP Storm Analysis
- Record Precipitation

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NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: IL

DATA DESCRIPTION

Data type: precipitation depth **Units:** english **Time series type:** partial duration

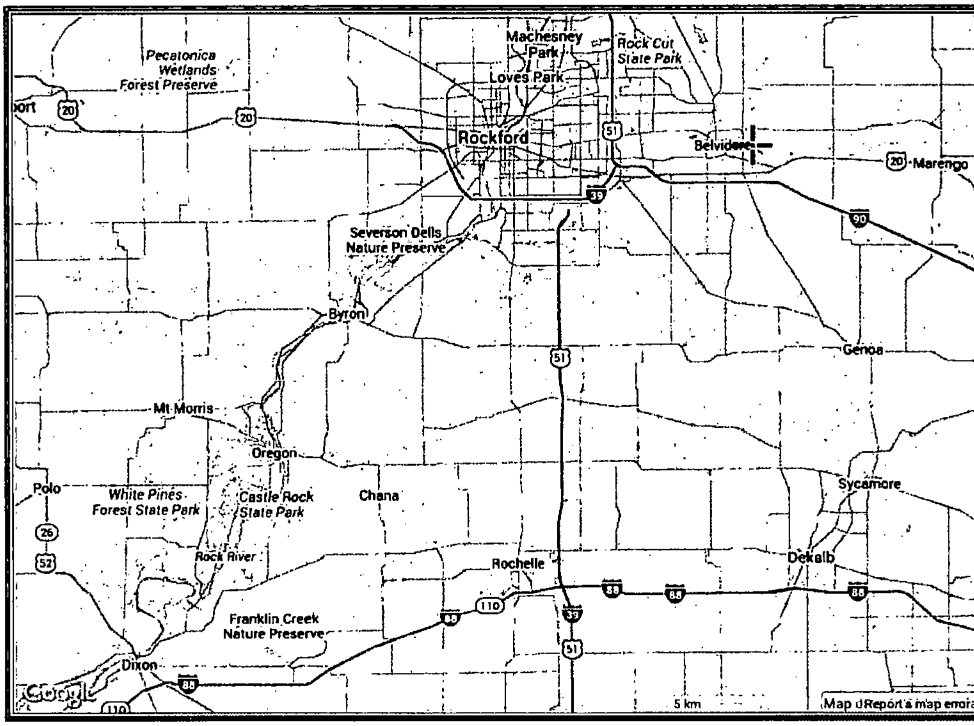
SELECT LOCATION

1. Manually:

a) Enter location (decimal degrees, use "-" for S and W): latitude: longitude: submit

b) Select station (click here for a list of stations used in frequency analysis for IL): select station

2. Use map:



a) Select location (move crosshair or double click)

b) Click on station icon (☐ show stations on map)

LOCATION INFORMATION:
Name: Garden Prairie, Illinois, US
Latitude: 42.2637
Longitude: -88.8121
Elevation: 762 ft*

* source: Google Maps

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES

WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
NOAA Atlas 14, Volume 2, Version 3

PF tabular | PF graphical | Supplementary information | Print Page

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.398** (0.362-0.438)	**0.463** (0.423-0.509)	**0.537** (0.490-0.589)	**0.617** (0.561-0.678)	**0.704** (0.637-0.775)	**0.784** (0.703-0.863)	**0.857** (0.763-0.948)	**0.936** (0.825-1.04)	**1.04** (0.902-1.17)	**1.13** (0.971-1.28)
10-min	**0.618** (0.562-0.680)	**0.723** (0.661-0.794)	**0.836** (0.761-0.916)	**0.963** (0.866-1.05)	**1.08** (0.975-1.19)	**1.19** (1.07-1.31)	**1.29** (1.15-1.43)	**1.40** (1.23-1.55)	**1.52** (1.33-1.71)	**1.66** (1.41-1.87)
15-min	**0.758** (0.689-0.834)	**0.884** (0.808-0.971)	**1.02** (0.935-1.12)	**1.17** (1.07-1.29)	**1.33** (1.20-1.46)	**1.47** (1.32-1.62)	**1.60** (1.43-1.77)	**1.74** (1.53-1.94)	**1.90** (1.66-2.14)	**2.06** (1.77-2.34)
30-min	**1.00** (0.912-1.10)	**1.18** (1.08-1.30)	**1.40** (1.28-1.54)	**1.63** (1.48-1.79)	**1.88** (1.70-2.07)	**2.10** (1.89-2.31)	**2.31** (2.06-2.56)	**2.54** (2.23-2.82)	**2.82** (2.45-3.17)	**3.09** (2.65-3.50)
60-min	**1.22** (1.11-1.35)	**1.45** (1.33-1.59)	**1.76** (1.61-1.93)	**2.07** (1.88-2.28)	**2.44** (2.21-2.68)	**2.77** (2.48-3.05)	**3.10** (2.76-3.42)	**3.44** (3.03-3.83)	**3.90** (3.39-4.38)	**4.34** (3.72-4.92)
2-hr	**1.44** (1.30-1.59)	**1.71** (1.55-1.88)	**2.07** (1.88-2.27)	**2.44** (2.21-2.68)	**2.90** (2.61-3.18)	**3.34** (2.98-3.65)	**3.77** (3.35-4.14)	**4.25** (3.73-4.68)	**4.91** (4.25-5.46)	**5.57** (4.74-6.26)
3-hr	**1.53** (1.39-1.70)	**1.82** (1.66-2.01)	**2.22** (2.02-2.45)	**2.63** (2.39-2.90)	**3.14** (2.83-3.45)	**3.62** (3.23-3.99)	**4.11** (3.64-4.53)	**4.63** (4.07-5.14)	**5.38** (4.65-6.00)	**6.11** (5.20-6.89)
6-hr	**1.80** (1.63-2.00)	**2.13** (1.94-2.37)	**2.63** (2.39-2.92)	**3.17** (2.86-3.51)	**3.87** (3.46-4.27)	**4.56** (4.04-5.03)	**5.29** (4.82-5.85)	**6.12** (5.27-6.79)	**7.32** (6.16-8.20)	**8.56** (7.05-9.71)

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12-hr	**2.07** (1.88-2.30)	**2.45** (2.24-2.72)	**3.00** (2.73-3.32)	**3.59** (3.26-3.96)	**4.36** (3.92-4.79)	**5.11** (4.64-5.63)	**5.91** (5.19-6.53)	**6.82** (5.90-7.56)	**8.13** (6.89-9.09)	**9.47** (7.88-10.7)
24-hr	**2.41** (2.22-2.64)	**2.91** (2.67-3.19)	**3.63** (3.33-3.98)	**4.22** (3.88-4.63)	**5.10** (4.62-5.60)	**5.86** (5.26-6.46)	**6.69** (5.93-7.41)	**7.64** (6.68-8.51)	**9.08** (7.77-10.2)	**10.3** (8.70-11.8)
2-day	**2.77** (2.54-3.04)	**3.33** (3.06-3.67)	**4.14** (3.79-4.55)	**4.80** (4.38-5.26)	**5.76** (5.22-6.35)	**6.58** (5.91-7.29)	**7.48** (6.64-8.34)	**8.48** (7.42-9.53)	**9.99** (8.56-11.3)	**11.3** (9.51-13.0)
3-day	**2.95** (2.72-3.22)	**3.54** (3.27-3.87)	**4.35** (4.01-4.75)	**5.01** (4.60-5.48)	**5.97** (5.44-6.54)	**6.78** (6.13-7.46)	**7.67** (6.86-8.49)	**8.66** (7.63-9.66)	**10.1** (8.76-11.5)	**11.4** (9.71-13.1)
4-day	**3.14** (2.90-3.40)	**3.75** (3.48-4.07)	**4.57** (4.22-4.95)	**5.23** (4.82-5.67)	**6.18** (5.66-6.72)	**6.98** (6.35-7.63)	**7.86** (7.08-8.64)	**8.84** (7.84-9.79)	**10.3** (8.95-11.6)	**11.6** (9.90-13.2)
7-day	**3.65** (3.40-3.93)	**4.34** (4.04-4.67)	**5.19** (4.83-5.59)	**5.88** (5.46-6.34)	**6.86** (6.32-7.41)	**7.67** (7.03-8.33)	**8.56** (7.76-9.34)	**9.51** (8.52-10.5)	**10.9** (9.61-12.2)	**12.1** (10.5-13.7)
10-day	**4.14** (3.87-4.44)	**4.91** (4.59-5.26)	**5.82** (5.43-6.24)	**6.56** (6.10-7.04)	**7.59** (7.03-8.16)	**8.45** (7.76-9.12)	**9.37** (8.54-10.2)	**10.4** (9.34-11.3)	**11.8** (10.5-13.0)	**13.0** (11.4-14.6)
20-day	**5.65** (5.30-6.03)	**6.70** (6.28-7.14)	**7.88** (7.37-8.41)	**8.79** (8.22-9.40)	**10.0** (9.34-10.7)	**11.1** (10.2-11.9)	**12.1** (11.1-13.1)	**13.2** (12.0-14.3)	**14.8** (13.3-16.2)	**16.1** (14.3-17.8)
30-day	**6.94** (6.52-7.37)	**8.20** (7.71-8.72)	**9.57** (9.00-10.2)	**10.6** (9.96-11.3)	**12.0** (11.2-12.8)	**13.1** (12.2-14.1)	**14.3** (13.2-15.4)	**15.5** (14.2-16.8)	**17.2** (15.6-18.7)	**18.5** (16.6-20.4)
45-day	**8.75** (8.23-9.26)	**10.3** (9.72-10.9)	**12.0** (11.3-12.7)	**13.2** (12.4-14.0)	**14.9** (13.9-15.8)	**16.2** (15.1-17.2)	**17.5** (16.2-18.7)	**18.8** (17.4-20.3)	**20.7** (18.9-22.5)	**22.2** (20.1-24.3)
60-day	**10.6** (10.0-11.2)	**12.5** (11.8-13.2)	**14.3** (13.6-15.2)	**15.7** (14.9-16.6)	**17.5** (16.5-18.6)	**18.9** (17.7-20.1)	**20.3** (19.0-21.6)	**21.7** (20.2-23.3)	**23.6** (21.8-25.5)	**25.1** (22.9-27.3)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimate: and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Estimates from the table in csv format: precipitation frequency estimates ▼ Submit

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Table 2-2a Runoff curve numbers for urban areas [1]

Cover type and hydrologic condition	Average percent impervious area [2]	A	B	C	D
		Curve numbers for hydrologic soil group			
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.
2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.
3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2b Runoff curve numbers for cultivated agricultural lands [1]

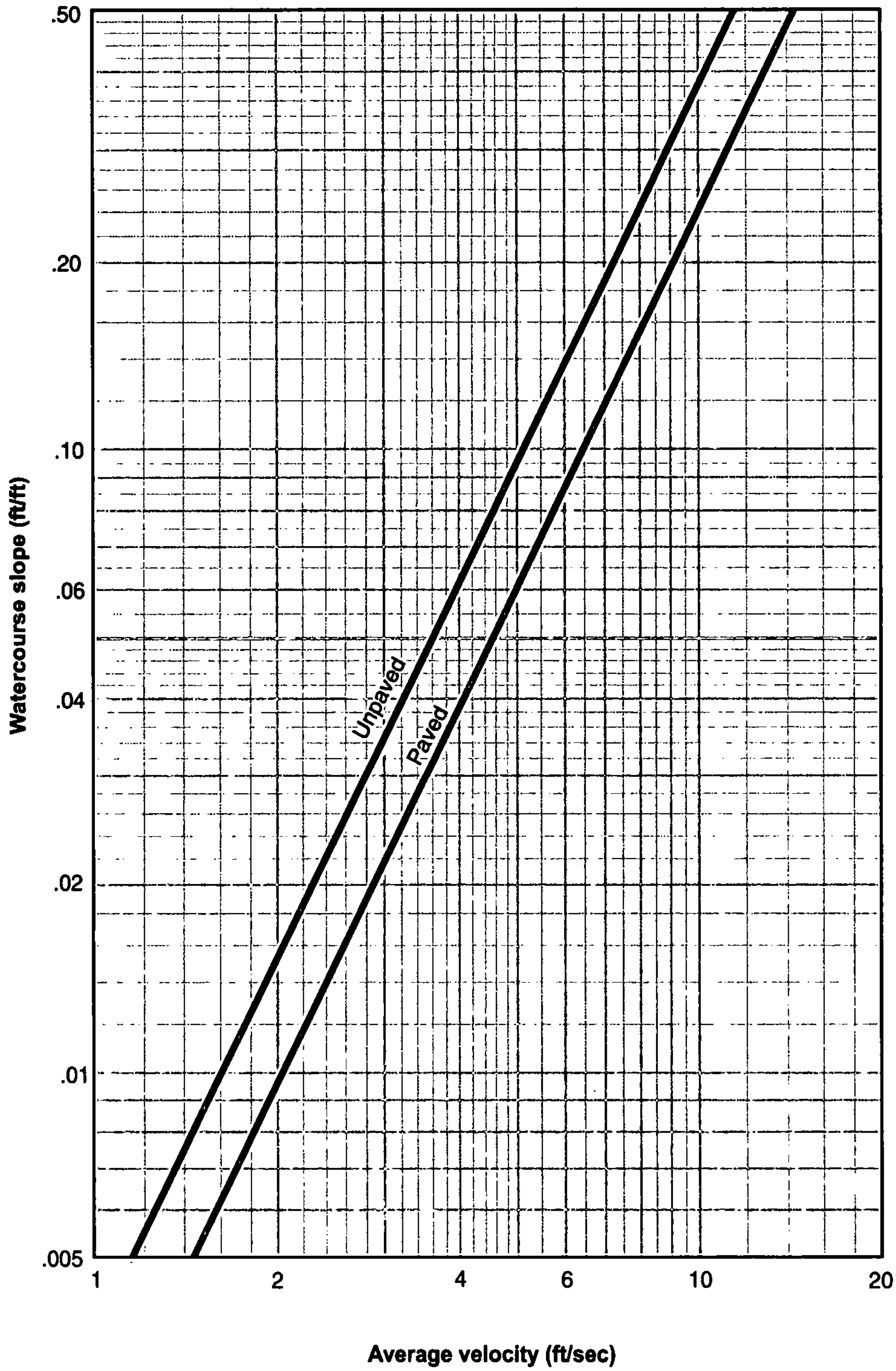
Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment [2]	Hydrologic condition [3]	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T+ CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

1 Average runoff condition, and I_a=0.2S
2 Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.
3 Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

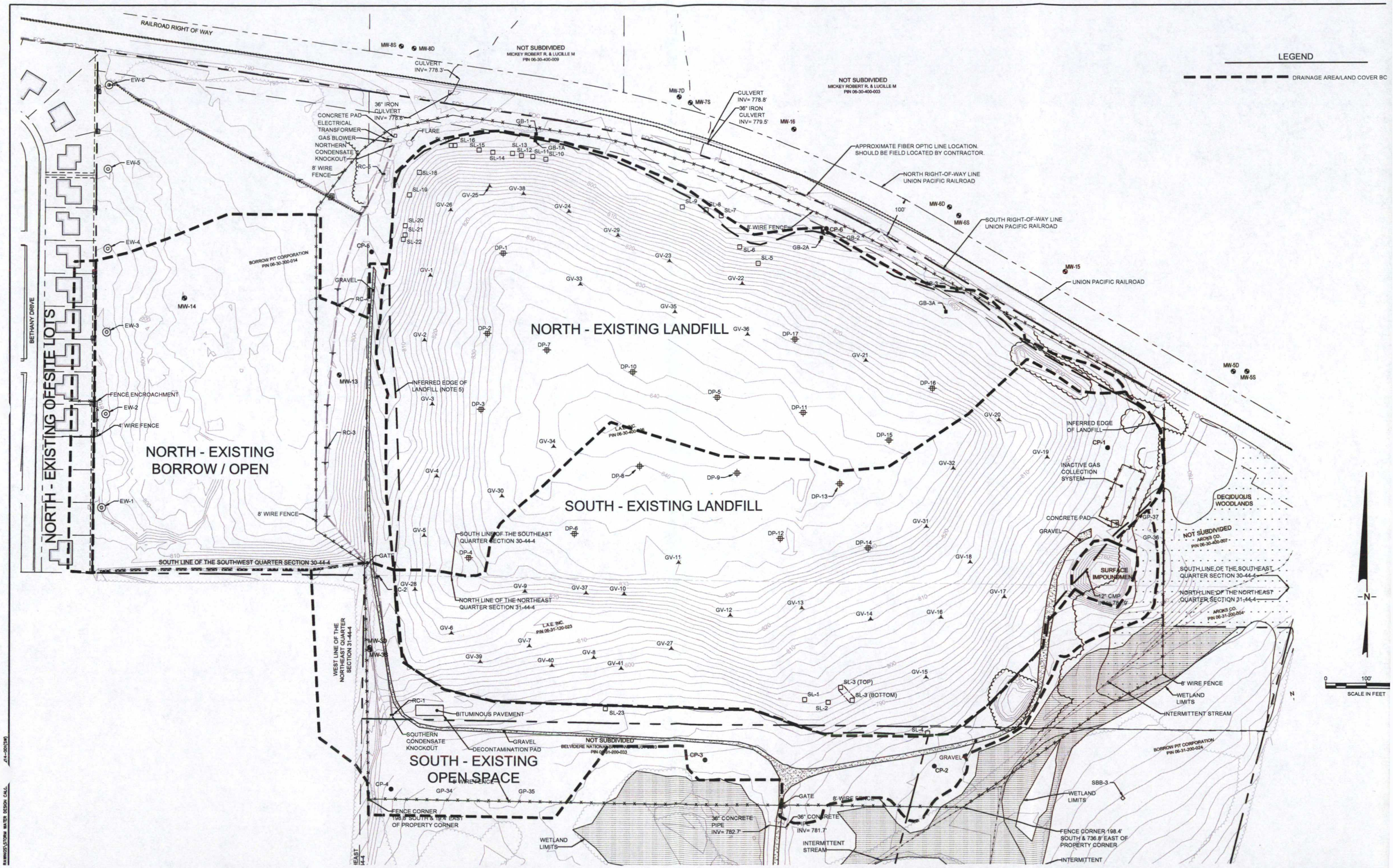
Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Figure 3-1 Average velocities for estimating travel time for shallow concentrated flow

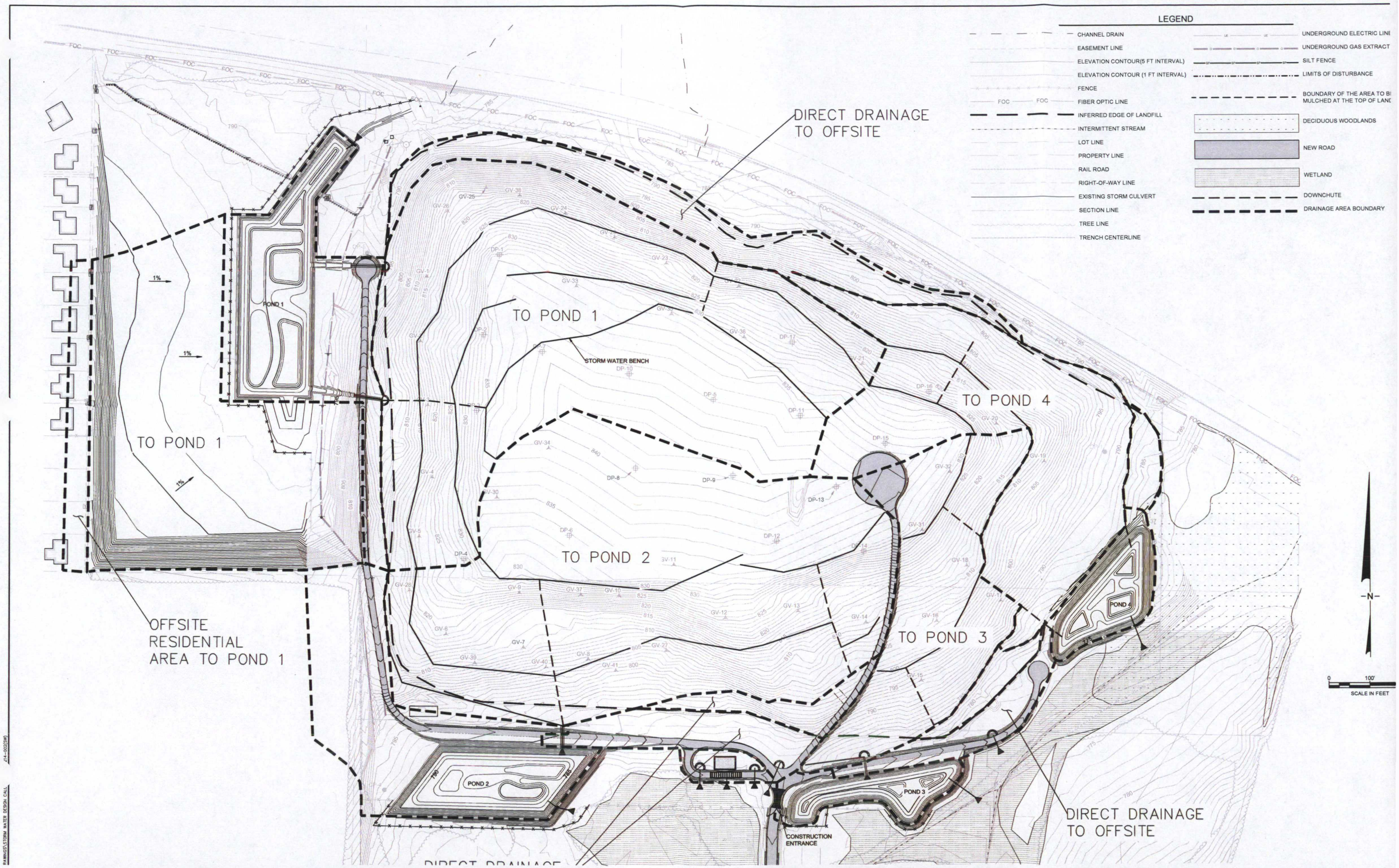


ATTACHMENT 2

Drainage Area Map



LEGEND
DRAINAGE AREA/LAND COVER BC
RAILROAD RIGHT OF WAY
NOT SUBDIVIDED
MICKEY ROBERT R. & LUCILLE M
PIN 06-30-400-009
NOT SUBDIVIDED
MICKEY ROBERT R. & LUCILLE M
PIN 06-30-400-003
CULVERT INV= 778.3'
CULVERT INV= 778.8'
36" IRON CULVERT INV= 779.5'
36" IRON CULVERT INV= 778.6'
CONCRETE PAD
ELECTRICAL TRANSFORMER
GAS BLOWER
NORTHERN CONDENSATE KNOCKOUT
8' WIRE FENCE
FLARE
APPROXIMATE FIBER OPTIC LINE LOCATION. SHOULD BE FIELD LOCATED BY CONTRACTOR.
NORTH RIGHT-OF-WAY LINE UNION PACIFIC RAILROAD
SOUTH RIGHT-OF-WAY LINE UNION PACIFIC RAILROAD
UNION PACIFIC RAILROAD
100'
BORROW PIT CORPORATION
PIN 06-30-300-014
NORTH - EXISTING LANDFILL
SOUTH - EXISTING LANDFILL
NORTH - EXISTING BORROW / OPEN
NORTH - EXISTING OFFSITE LOTS
SOUTH - EXISTING OPEN SPACE
BETHANY DRIVE
FENCE ENCROACHMENT
4' WIRE FENCE
8' WIRE FENCE
INFERRED EDGE OF LANDFILL (NOTE 5)
SOUTH LINE OF THE SOUTHEAST QUARTER SECTION 30-44-4
NORTH LINE OF THE NORTHEAST QUARTER SECTION 31-44-4
SOUTH LINE OF THE SOUTHWEST QUARTER SECTION 30-44-4
WEST LINE OF THE NORTHEAST QUARTER SECTION 31-44-4
L.A.E. INC.
PIN 06-31-120-023
INFERRED EDGE OF LANDFILL
INACTIVE GAS COLLECTION SYSTEM
CONCRETE PAD
GRAVEL
SURFACE IMPOUNDMENT
DECIDUOUS WOODLANDS
NOT SUBDIVIDED
AROKS CO.
PIN 06-30-400-007
SOUTH LINE OF THE SOUTHEAST QUARTER SECTION 30-44-4
NORTH LINE OF THE NORTHEAST QUARTER SECTION 31-44-4
AROKS CO.
PIN 06-31-200-004
8' WIRE FENCE
WETLAND LIMITS
INTERMITTENT STREAM
BORROW PIT CORPORATION
PIN 06-31-200-024
SBB-3
WETLAND LIMITS
FENCE CORNER 198.4' SOUTH & 736.8' EAST OF PROPERTY CORNER
INTERMITTENT
BITUMINOUS PAVEMENT
SOUTHERN CONDENSATE KNOCKOUT
GRAVEL
DECONTAMINATION PAD
NOT SUBDIVIDED
PIN 06-31-200-033
GATE
8' WIRE FENCE
36" CONCRETE PIPE INV= 782.7'
36" CONCRETE PIPE INV= 781.7'
INTERMITTENT STREAM
WETLAND LIMITS
FENCE CORNER
OF PROPERTY CORNER
SL-3 (TOP)
SL-3 (BOTTOM)
MW-13
MW-14
MW-15
MW-16
EW-1
EW-2
EW-3
EW-4
EW-5
EW-6
CP-1
CP-2
CP-3
CP-4
CP-5
CP-6
GP-34
GP-35
GP-36
GP-37
N
-N-
0
100'
SCALE IN FEET



LEGEND
CHANNEL DRAIN
EASEMENT LINE
ELEVATION CONTOUR(5 FT INTERVAL)
ELEVATION CONTOUR (1 FT INTERVAL)
FENCE
FIBER OPTIC LINE
INFERRED EDGE OF LANDFILL
INTERMITTENT STREAM
LOT LINE
PROPERTY LINE
RAIL ROAD
RIGHT-OF-WAY LINE
EXISTING STORM CULVERT
SECTION LINE
TREE LINE
TRENCH CENTERLINE
UNDERGROUND ELECTRIC LINE
UNDERGROUND GAS EXTRACT
SILT FENCE
LIMITS OF DISTURBANCE
BOUNDARY OF THE AREA TO BE MULCHED AT THE TOP OF LAND
DECIDUOUS WOODLANDS
NEW ROAD
WETLAND
DOWNCHUTE
DRAINAGE AREA BOUNDARY
DIRECT DRAINAGE TO OFFSITE
TO POND 1
TO POND 2
TO POND 3
TO POND 4
STORM WATER BENCH
POND 1
POND 2
POND 3
POND 4
OFFSITE RESIDENTIAL AREA TO POND 1
DIRECT DRAINAGE TO OFFSITE
CONSTRUCTION ENTRANCE
DIRECT DRAINAGE
SCALE IN FEET
N

ATTACHMENT 3

Time of Concentration Calculations

TR-55, Worksheet 3: Time of Concentration (T_c) or Travel time (T_t)

Project: MIG Dewane Landfill
Location: Belvidere, Illinois
By: Aaron Volkening, GeoSyntec Consultants
Date: March 19, 2014

Subbasin / flow path : North downchute, upper benches, west bench

Sheet Flow

		Units					
	Segment ID		AB				
1	Surface Description (Table 3-1)		Dense Gr.				
2	Manning's roughness coeff., n (Table 3-1)		0.24				
3	Flow Length, L (Total L<300')	ft	190				
4	2-yr, 24-hr rainfall, P_2	in	2.91				
5		ft/ft	0.03				
6	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}s^{0.4}}$ uation 3-3)	hr	0.35	+		=	0.35

Shallow Concentrated Flow

		Units					
	Segment ID		BC				
7	Surface Description (Paved or Unpaved)		Unpaved				
8	Flow Length, L	ft	0				
9	Watercourse Slope, s	ft/ft	0.01				
10	ocity, V (Figure 3-1)	ft/s	1.6				
11	$T_t = \frac{L}{3600V}$ T_t (Equation 3-1)	hr	0.00	+		=	0.00

Channel Flow

		Units					
	Segment ID		AB				
12	Cross-sectional flow area, a	ft^2	2.65				
13	Wetted Perimeter, P_w	ft	5.95				
14	Hydraulic Radius, $r = a/P_w$	ft	0.45				
15	Channel Slope, s	ft/ft	0.02				
16	Manning's roughness coefficient, n		0.03				
17	Velocity $v = [(1.49/n)\, r^{0.67}\, s^{0.5}]$	ft/s	4.11				
18	Flow Length, L	ft	245				
19	Travel time, T_t=[L/3600V]	hr	0.02	+		=	0.02

20 Watershed Time of Concentration, T_c ....hours **0.37**

TR-55, Worksheet 3: Time of Concentration (T_c) or Travel time (T_t)

Project: MIG Dewane Landfill
Location: Belvidere, Illinois
By: Aaron Volkening, GeoSyntec Consultants
Date: March 19, 2014

Subbasin / flow path : North downchute, upper benches, east bench

Sheet Flow

		Units	Segment ID: AB	Segment ID:	Total
1	Surface Description (Table 3-1)		Dense Gr.		
2	Manning's roughness coeff., n (Table 3-1)		0.24		
3	Flow Length, L (Total L<300')	ft	190		
4	2-yr, 24-hr rainfall, P_2	in	2.91		
5		ft/ft	0.03		
6	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ uation 3-3)	hr	0.35	+	= 0.35

Shallow Concentrated Flow

		Units	Segment ID: BC	Segment ID:	Total
7	Surface Description (Paved or Unpaved)		Unpaved		
8	Flow Length, L	ft	0		
9	Watercourse Slope, s	ft/ft	0.01		
10	ocity, V (Figure 3-1)	ft/s	1.6		
11	$T_t = \frac{L}{3600V}$ T_t (Equation 3-1)	hr	0.00	+	= 0.00

Channel Flow

		Units	Segment ID: AB	Segment ID:	Total
12	Cross-sectional flow area, a	ft^2	3.9		
13	Wetted Perimeter, P_w	ft	7.2		
14	Hydraulic Radius, $r = a/P_w$	ft	0.54		
15	Channel Slope, s	ft/ft	0.02		
16	Manning's roughness coefficient, n		0.03		
17	Velocity $v = [(1.49/n)\, r^{0.67} s^{0.5}]$	ft/s	4.65		
18	Flow Length, L	ft	315		
19	Travel time, $T_t=[L/3600V]$	hr	0.02	+	= 0.02

20 Watershed Time of Concentration, T_c ....hours 0.37

TR-55, Worksheet 3: Time of Concentration (T_c) or Travel time (T_t)

Project: MIG Dewane Landfill
Location: Belvidere, Illinois
By: Aaron Volkening, GeoSyntec Consultants
Date: March 19, 2014

Subbasin / flow path : North downchute, middle benches, east bench

Sheet Flow

			Segment ID				
			AB				
1	Surface Description (Table 3-1)		Dense Gr.				
2	Manning's roughness coeff., n (Table 3-1)		0.24				
3	Flow Length, L (Total L<300')	ft	115				
4	2-yr, 24-hr rainfall, P_2	in	2.91				
5		ft/ft	0.07				
6	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}s^{0.4}}$ uation 3-3)	hr	0.17	+		=	0.17

Shallow Concentrated Flow

			Segment ID				
			BC				
7	Surface Description (Paved or Unpaved)		Unpaved				
8	Flow Length, L	ft	0				
9	Watercourse Slope, s	ft/ft	0.01				
10	ocity, V (Figure 3-1)	ft/s	1.6				
11	$T_t = \frac{L}{3600V}$ T_t (Equation 3-1)	hr	0.00	+		=	0.00

Channel Flow

			Segment ID				
			AB				
12	Cross-sectional flow area, a	ft^2	1.92				
13	Wetted Perimeter, P_w	ft	5.06				
14	Hydraulic Radius, $r = a/P_w$	ft	0.38				
15	Channel Slope, s	ft/ft	0.02				
16	Manning's roughness coefficient, n		0.03				
17	Velocity $v = [(1.49/n)\ r^{0.67}\ s^{0.5}]$	ft/s	3.67				
18	Flow Length, L	ft	380				
19	Travel time, T_t=[L/3600V]	hr	0.03	+		=	0.03

20 Watershed Time of Concentration, T_c ....hours 0.20

TR-55, Worksheet 3: Time of Concentration (T_c) or Travel time (T_t)

Project: MIG Dewane Landfill
Location: Belvidere, Illinois
By: Aaron Volkening, GeoSyntec Consultants
Date: March 19, 2014

Subbasin / flow path : Northeast downchute, middle benches, east bench

Sheet Flow

		Segment ID	AB			
1	Surface Description (Table 3-1)		Dense Gr.			
2	Manning's roughness coeff., n (Table 3-1)		0.24			
3	Flow Length, L (Total L<300')	ft	100			
4	2-yr, 24-hr rainfall, P_2	in	2.91			
5		ft/ft	0.18			
6	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ uation 3-3)	hr	0.10	+		= 0.10

Shallow Concentrated Flow

		Segment ID	BC			
7	Surface Description (Paved or Unpaved)		Unpaved			
8	Flow Length, L	ft	0			
9	Watercourse Slope, s	ft/ft	0.01			
10	$T_t = \frac{L}{3600V}$ ocity, V (Figure 3-1)	ft/s	1.6			
11	T_t (Equation 3-1)	hr	0.00	+		= 0.00

Channel Flow

		Segment ID	AB			
12	Cross-sectional flow area, a	ft^2	1.01			
13	Wetted Perimeter, P_w	ft	3.67			
14	Hydraulic Radius, $r = a/P_w$	ft	0.28			
15	Channel Slope, s	ft/ft	0.02			
16	Manning's roughness coefficient, n		0.03			
17	Velocity $v = [(1.49/n)\ r^{0.67}\ s^{0.5}]$	ft/s	2.96			
18	Flow Length, L	ft	130			
19	Travel time, T_t=[L/3600V]	hr	0.01	+		= 0.01

20	Watershed Time of Concentration, T_c	....hours	0.12

TR-55, Worksheet 3: Time of Concentration (T_c) or Travel time (T_t)

Project: MIG Dewane Landfill
Location: Belvidere, Illinois
By: Aaron Volkening, GeoSyntec Consultants
Date: March 19, 2014

Subbasin / flow path : Northeast downchute, upper benches, west bench

Sheet Flow		**Segment ID**	AB				
1	Surface Description (Table 3-1)		Dense Gr.				
2	Manning's roughness coeff., n (Table 3-1)		0.24				
3	Flow Length, L (Total L<300')	ft	195				
4	2-yr, 24-hr rainfall, P_2	in	2.91				
5		ft/ft	0.04				
6	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ uation 3-3)	hr	0.32	+		=	0.32

Shallow Concentrated Flow		**Segment ID**	BC				
7	Surface Description (Paved or Unpaved)		Unpaved				
8	Flow Length, L	ft	0				
9	Watercourse Slope, s	ft/ft	0.01				
10	ocity, V (Figure 3-1)	ft/s	1.6				
11	$T_t = \frac{L}{3600V}$ T_t (Equation 3-1)	hr	0.00	+		=	0.00

Channel Flow		**Segment ID**	CD				
12	Cross-sectional flow area, a	ft^2	4.18				
13	Wetted Perimeter, P_w	ft	7.46				
14	Hydraulic Radius, $r = a/P_w$	ft	0.56				
15	Channel Slope, s	ft/ft	0.02				
16	Manning's roughness coefficient, n		0.03				
17	Velocity $v = [(1.49/n)\ r^{0.67}\ s^{0.5}]$	ft/s	4.76				
18	Flow Length, L	ft	170				
19	Travel time, T_t=[L/3600V]	hr	0.01	+		=	0.01

20 Watershed Time of Concentration, T_c ....hours **0.33**

TR-55, Worksheet 3: Time of Concentration (T_c) or Travel time (T_t)

Project: MIG Dewane Landfill
Location: Belvidere, Illinois
By: Aaron Volkening, GeoSyntec Consultants
Date: March 19, 2014

Subbasin / flow path : Southwest downchute, upper benches, east bench

Sheet Flow

			Segment ID	AB			
1	Surface Description (Table 3-1)			Dense Gr.			
2	Manning's roughness coeff., n (Table 3-1)			0.24			
3	Flow Length, L (Total L<300')	ft		210			
4	2-yr, 24-hr rainfall, P_2	in		2.91			
5		ft/ft		0.03			
6	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}s^{0.4}}$ uation 3-3)	hr		0.38	+		= 0.38

Shallow Concentrated Flow

			Segment ID	BC			
7	Surface Description (Paved or Unpaved)			Unpaved			
8	Flow Length, L	ft		0			
9	Watercourse Slope, s	ft/ft		0.01			
10	ocity, V (Figure 3-1)	ft/s		1.6			
11	$T_t = \frac{L}{3600V}$ T_t (Equation 3-1)	hr		0.00	+		= 0.00

Channel Flow

			Segment ID	AB			
12	Cross-sectional flow area, a	ft^2		4.6			
13	Wetted Perimeter, P_w	ft		7.84			
14	Hydraulic Radius, $r = a/P_w$	ft		0.59			
15	Channel Slope, s	ft/ft		0.02			
16	Manning's roughness coefficient, n			0.03			
17	Velocity $v = [(1.49/n)\ r^{0.67}\ s^{0.5}]$	ft/s		4.91			
18	Flow Length, L	ft		475			
19	Travel time, T_t=[L/3600V]	hr		0.03	+		= 0.03

20 Watershed Time of Concentration, T_c ....hours 0.41
minutes 25

TR-55, Worksheet 3: Time of Concentration (T_c) or Travel time (T_t)

Project: MIG Dewane Landfill
Location: Belvidere, Illinois
By: Aaron Volkening, GeoSyntec Consultants
Date: March 19, 2014

Subbasin / flow path : South central downchute, upper benches, west bench

Sheet Flow

			Segment ID	AB			
1	Surface Description (Table 3-1)			Dense Gr.			
2	Manning's roughness coeff., n (Table 3-1)			0.24			
3	Flow Length, L (Total L<300')	ft		205			
4	2-yr, 24-hr rainfall, P_2	in		2.91			
5		ft/ft		0.03			
6	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}s^{0.4}}$ uation 3-3)	hr		0.38	+		= 0.38

Shallow Concentrated Flow

			Segment ID	BC			
7	Surface Description (Paved or Unpaved)			Unpaved			
8	Flow Length, L	ft		0			
9	Watercourse Slope, s	ft/ft		0.01			
10	$T_t = \frac{L}{3600V}$ ocity, V (Figure 3-1)	ft/s		1.6			
11	T_t (Equation 3-1)	hr		0.00	+		= 0.00

Channel Flow

			Segment ID	AB			
12	Cross-sectional flow area, a	ft^2		1.47			
13	Wetted Perimeter, P_w	ft		4.43			
14	Hydraulic Radius, $r = a/P_w$	ft		0.33			
15	Channel Slope, s	ft/ft		0.02			
16	Manning's roughness coefficient, n			0.03			
17	Velocity $v = [(1.49/n)\ r^{0.67}\ s^{0.5}]$	ft/s		3.35			
18	Flow Length, L	ft		170			
19	Travel time, T_t=[L/3600V]	hr		0.01	+		= 0.01

20 Watershed Time of Concentration, T_c ....hours 0.39
minutes 23

TR-55, Worksheet 3: Time of Concentration (T_c) or Travel time (T_t)

Project: MIG Dewane Landfill
Location: Belvidere, Illinois
By: Aaron Volkening, GeoSyntec Consultants
Date: March 19, 2014

Subbasin / flow path : Major bench: southeast midlevel

Sheet Flow

Segment ID			AB			
1	Surface Description (Table 3-1)		Dense Gr.			
2	Manning's roughness coeff., n (Table 3-1)		0.24			
3	Flow Length, L (Total L<300')	ft	150			
4	2-yr, 24-hr rainfall, P_2	in	2.91			
5		ft/ft	0.047			
6	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}s^{0.4}}$ uation 3-3)	hr	0.25	+		= 0.25

Shallow Concentrated Flow

Segment ID			BC			
7	Surface Description (Paved or Unpaved)		Unpaved			
8	Flow Length, L	ft	25			
9	Watercourse Slope, s	ft/ft	0.2			
10	$T_t = \frac{L}{3600V}$ ocity, V (Figure 3-1)	ft/s	7			
11	T_t (Equation 3-1)	hr	0.00	+		= 0.00

Channel Flow

Segment ID			CD			
12	Cross-sectional flow area, a	ft^2	5.03			
13	Wetted Perimeter, P_w	ft	11.63			
14	Hydraulic Radius, $r = a/P_w$	ft	0.43			
15	Channel Slope, s	ft/ft	0.02			
16	Manning's roughness coefficient, n		0.03			
17	Velocity $v = [(1.49/n)\, r^{0.67}\, s^{0.5}]$	ft/s	4.01			
18	Flow Length, L	ft	365			
19	Travel time, T_t=[L/3600V]	hr	0.03	+		= 0.03

20 Watershed Time of Concentration, T_c ....hours 0.27
minutes 16

TR-55, Worksheet 3: Time of Concentration (T_c) or Travel time (T_t)

Project: MIG Dewane Landfill
Location: Belvidere, Illinois
By: Aaron Volkening, GeoSyntec Consultants
Date: March 31, 2014

Subbasin / flow path : Existing conditions, overall south basin

Sheet Flow

		Segment ID	AB			
1	Surface Description (Table 3-1)		Dense Gr.			
2	Manning's roughness coeff., n (Table 3-1)		0.24			
3	Flow Length, L (Total L<300')	ft	175			
4	2-yr, 24-hr rainfall, P_2	in	2.91			
5		ft/ft	0.037			
6	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ uation 3-3)	hr	0.31	+		= 0.31

Shallow Concentrated Flow - Segment 1

		Segment ID	BC			
7	Surface Description (Paved or Unpaved)		Unpaved			
8	Flow Length, L	ft	220			
9	Watercourse Slope, s	ft/ft	0.023			
10	$T_t = \frac{L}{3600V}$ ocity, V (Figure 3-1)	ft/s	2.4			
11	T_t (Equation 3-1)	hr	0.03	+		= 0.03

Shallow Concentrated Flow - Segment 2

		Segment ID	CD			
7	Surface Description (Paved or Unpaved)		Unpaved			
8	Flow Length, L	ft	415			
9	Watercourse Slope, s	ft/ft	0.1			
10	Average Velocity, V (Figure 3-1)	ft/s	5			
11	Travel time, T_t (Equation 3-1)	hr	0.02	+		= 0.02

Channel Flow

		Segment ID	AB			
12	Cross-sectional flow area, a	ft^2	1.47			
13	Wetted Perimeter, P_w	ft	4.43			
14	Hydraulic Radius, $r = a/P_w$	ft	0.33			
15	Channel Slope, s	ft/ft	0.02			
16	Manning's roughness coefficient, n		0.03			
17	Velocity $v = [(1.49/n)\, r^{0.67} s^{0.5}]$	ft/s	3.35			
18	Flow Length, L	ft	0			
19	Travel time, T_t=[L/3600V]	hr	0.00	+		= 0.00

20 Watershed Time of Concentration, T_c ....hours 0.35
minutes 21

TR-55, Worksheet 3: Time of Concentration (T_c) or Travel time (T_t)

Project: MIG Dewane Landfill
Location: Belvidere, Illinois
By: Aaron Volkening, GeoSyntec Consultants
Date: March 31, 2014

Subbasin / flow path : Existing conditions, overall north basin

Sheet Flow		**Segment ID**	AB				
1	Surface Description (Table 3-1)		Dense Gr.				
2	Manning's roughness coeff., n (Table 3-1)		0.24				
3	Flow Length, L (Total L<300')	ft	160				
4	2-yr, 24-hr rainfall, P_2	in	2.91				
5		ft/ft	0.028				
6	$T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ uation 3-3)	hr	0.32	+		=	0.32

Shallow Concentrated Flow - Segment 1		**Segment ID**	BC				
7	Surface Description (Paved or Unpaved)		Unpaved				
8	Flow Length, L	ft	180				
9	Watercourse Slope, s	ft/ft	0.028				
10	$T_t = \frac{L}{3600V}$ ocity, V (Figure 3-1)	ft/s	2.7				
11	T_t (Equation 3-1)	hr	0.02	+		=	0.02

Shallow Concentrated Flow - Segment 2		**Segment ID**	CD				
7	Surface Description (Paved or Unpaved)		Unpaved				
8	Flow Length, L	ft	255				
9	Watercourse Slope, s	ft/ft	0.11				
10	Average Velocity, V (Figure 3-1)	ft/s	5.2				
11	Travel time, T_t (Equation 3-1)	hr	0.01	+		=	0.01

Channel Flow		**Segment ID**	DE				
12	Cross-sectional flow area, a	ft^2	28				
13	Wetted Perimeter, P_w	ft	28.3				
14	Hydraulic Radius, $r = a/P_w$	ft	0.99				
15	Channel Slope, s	ft/ft	0.03				
16	Manning's roughness coefficient, n		0.04				
17	Velocity $v = [(1.49/n)\, r^{0.67} s^{0.5}]$	ft/s	6.41				
18	Flow Length, L	ft	770				
19	Travel time, T_t=[L/3600V]	hr	0.03	+		=	0.03

20	Watershed Time of Concentration, T_c	....hours	0.38
		minutes	23

ATTACHMENT 4

Pond Stage Storage Tables

Pond 1 (Northwest Pond)					
Elevation	Area_sqft	Area_acres	Incremental storage (cu ft)	Cumulative storage above NWL (cu ft)	Cumulative storage above NWL (acre-ft)
787	80,435	1.85			
788	85,220	1.96	82,828	82,828	1.90
789	90,080	2.07	87,650	170,478	3.91
790	95,015	2.18	92,548	263,025	6.04
791	100,027	2.30	97,521	360,546	8.28
792	105,115	2.41	102,571	463,117	10.63

Pond 2 (Southwest Pond)					
Elevation	Area_sqft	Area_acres	Incremental storage (cu ft)	Cumulative storage above NWL (cu ft)	Cumulative storage above NWL (acre-ft)
784	46,586	1.07			
785	49,706	1.14	48,146	48,146	1.11
787	56,212	1.29	105,918	154,064	3.54
789	63,074	1.45	119,286	273,350	6.28
791	70,291	1.61	133,365	406,715	9.34

Pond 3 (Southeast Pond)					
Elevation	Area_sqft	Area_acres	Incremental storage (cu ft)	Cumulative storage above NWL (cu ft)	Cumulative storage above NWL (acre-ft)
776	19,510	0.45			
778	25,313	0.58	44,823	44,823	1.03
780	31,340	0.72	56,653	101,476	2.33
781	34,440	0.79	32,890	134,366	3.08

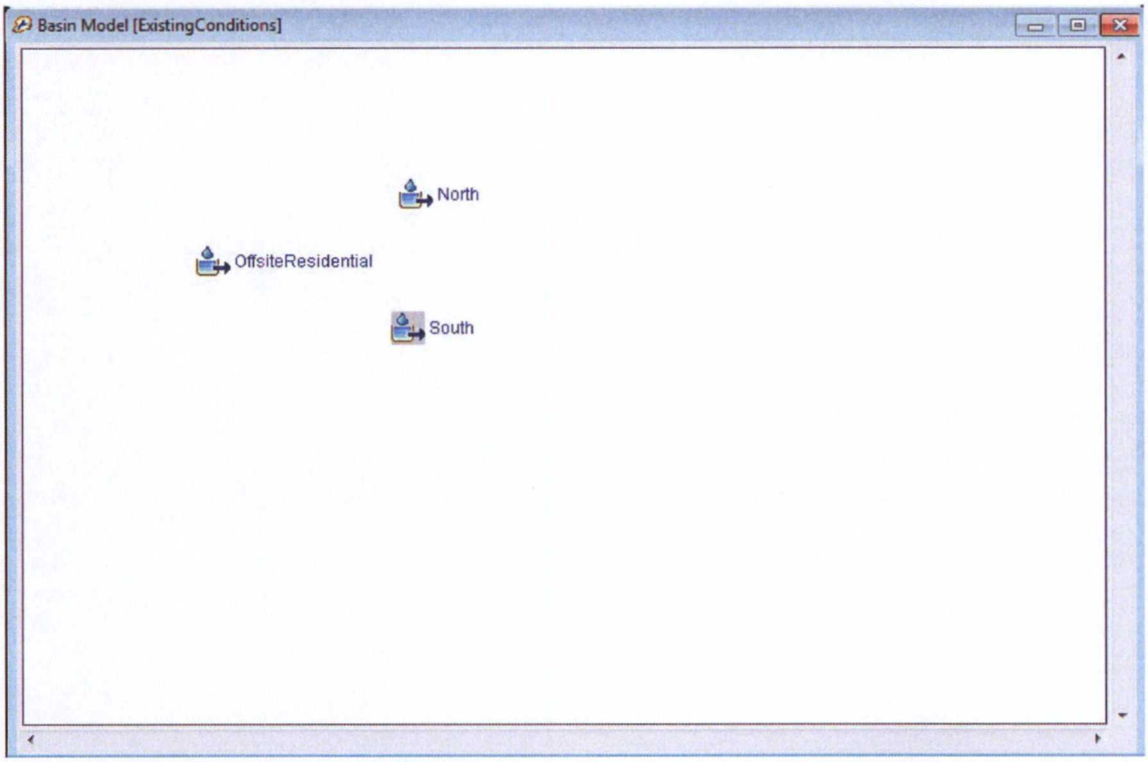
Pond 4 (East Pond)					
Elevation	Area_sqft	Area_acres	Incremental storage (cu ft)	Cumulative storage above NWL (cu ft)	Cumulative storage above NWL (acre-ft)
773	27,050	0.62			
775	31,050	0.71	58,100	58,100	1.33
777	35,195	0.81	66,245	124,345	2.85
778	37,330	0.86	36,263	160,608	3.69
779	39,500	0.91	38,415	199,023	4.57

ATTACHMENT 5

HEC-HMS Input and Output

EXISTING CONDITIONS

HEC-HMS INPUT



Subbasin Area [ExistingConditions]

Show Elements: All Elements Sorting: Hydrologic

Subbasin	Area (MI2)
South	0.0541
North	0.0587
OffsiteResidential	0.00153

Apply Close

Curve Number Loss [ExistingConditions]

Show Elements: All Elements Sorting: Hydrologic

Subbasin	Initial Abstraction (IN)	Curve Number	Impervious (%)
South		81	0.0
North		79	0.0
OffsiteResidential		75	0.0

SCS Transform[ExistingConditions]

Show Elements: All Elements

Subbasin	Lag Time (MIN)
South	13
North	14
OffsiteResidential	10

EXISTING CONDITIONS

HEC-HMS OUTPUT

HEC-HMS: existing conditions **April 10, 2014**

Global Summary Results for Run "100yr"

Project: ExistingConditions Simulation Run: 100yr

Start of Run: 01Jan2011, 00:00 Basin Model: ExistingConditions
End of Run: 05Jan2011, 00:00 Meteorologic Model: 100 yr
Compute Time: 10Apr2014, 13:06:10 Control Specifications: Control 1

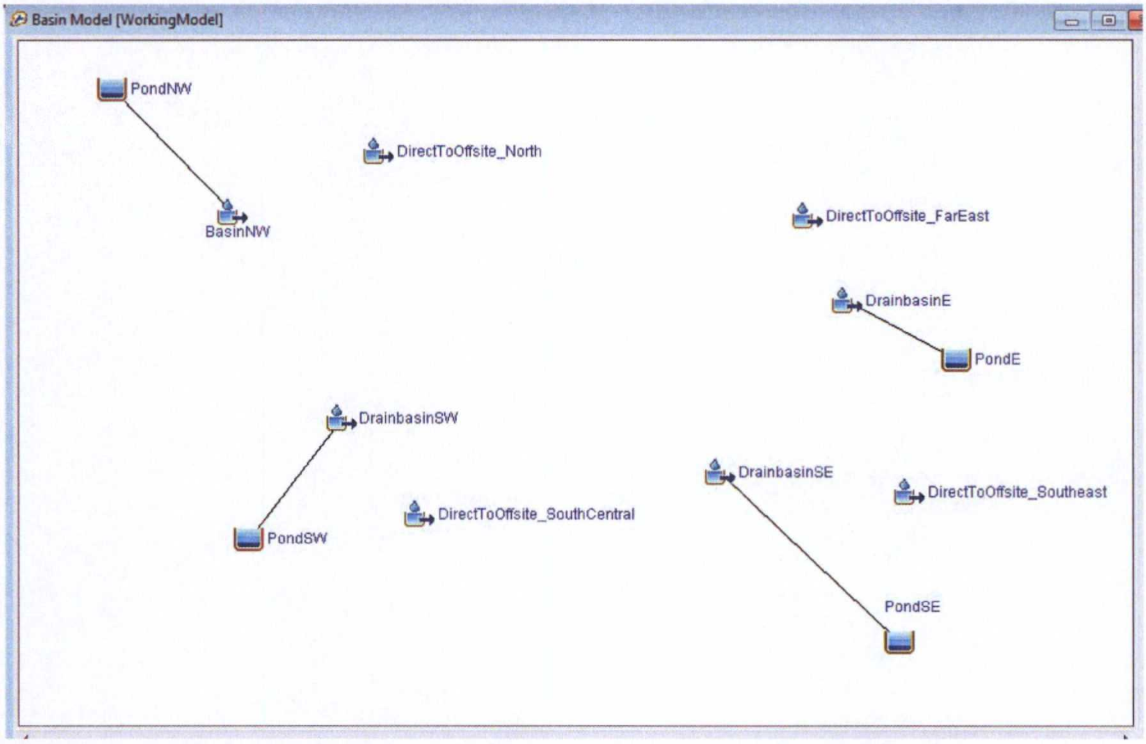
Show Elements: All Elements Volume Units: IN AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
South	0.05410	170.4	01Jan2011, 12:06	4.52
North	0.05870	170.2	01Jan2011, 12:07	4.30
OffsiteResidential	0.00153	4.7	01Jan2011, 12:03	3.88

POST-PROJECT CONDITIONS
STORMWATER DETENTION PONDS
AND DIRECT TO OFFSITE DRAINAGE AREAS

HEC-HMS INPUT

HEC-HMS: post-project conditions **April 10, 2014**



Subbasin Area [WorkingModel]

Show Elements: All Elements   Sorting: Hydrologic

Subbasin	Area (MI2)
BasinNW	0.0479
DrainbasinSW	0.0323
DrainbasinE	0.0132
DrainbasinSE	0.0092
DirectToOffsite_SouthC...	0.0037
DirectToOffsite_FarEast	0.0006
DirectToOffsite_North	0.0044
DirectToOffsite_Southeast	0.0021

Curve Number Loss [WorkingModel]

Show Elements: All Elements Sorting: Hydrologic

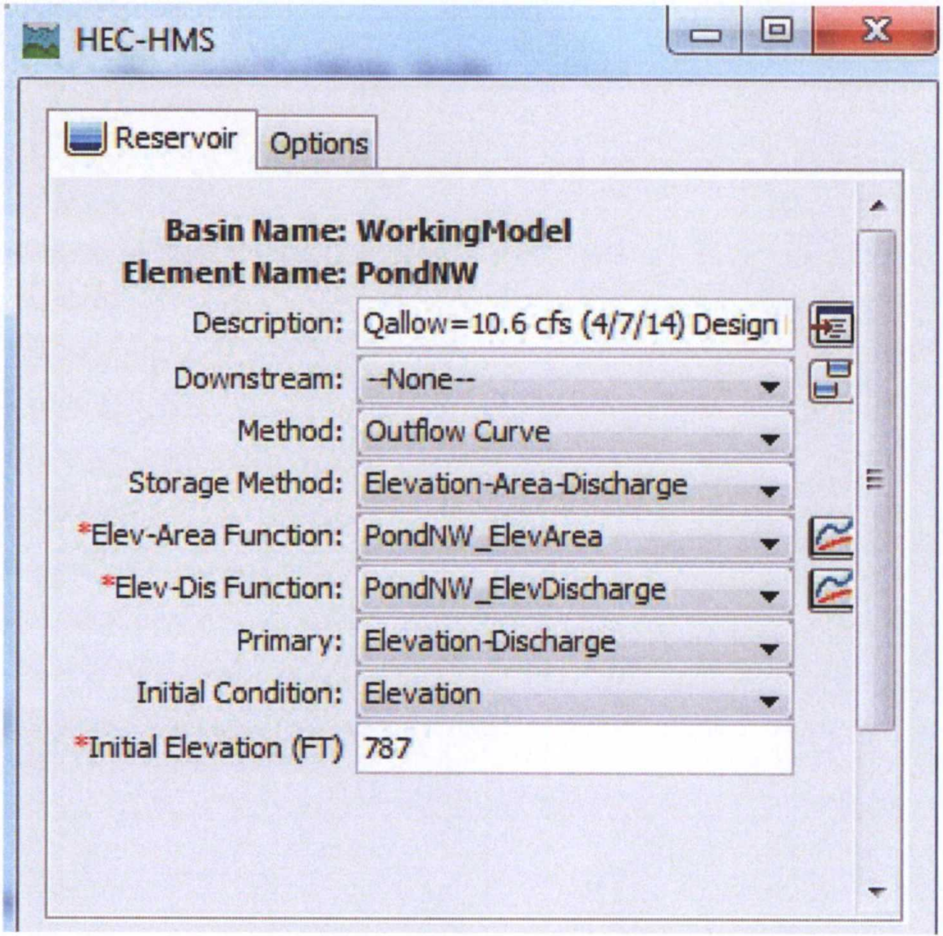
Subbasin	Initial Abstraction (IN)	Curve Number	Impervious (%)
BasinNW		80	0.0
DrainbasinSW		89	0.0
DrainbasinE		89	0.0
DrainbasinSE		89	0.0
DirectToOffsite_SouthC...		73	0.0
DirectToOffsite_FarEast		89	0.0
DirectToOffsite_North		89	0.0
DirectToOffsite_Southeast		70	0.0

SCS Transform[WorkingModel]

Show Elements: All Elements Sorting: Hydrologic

Subbasin	Lag Time (MIN)
BasinNW	15
DrainbasinSW	16
DrainbasinE	14
DrainbasinSE	10
DirectToOffsite_So...	5
DirectToOffsite_Fa...	5
DirectToOffsite_No...	5
DirectToOffsite_So...	5

Pond 1 (Northwest Pond) input data



HEC-HMS: post-project conditions

April 10, 2014

Elevation-Area Data

Select a Paired Data

Select | Table | Graph

Elevation (FT)	Area (AC)
786.75	0.0010
786.99	0.0011
787.00	1.8500
788.00	1.9600
789.00	2.0700
790.00	2.1800
791.00	2.3000
792.00	2.4100

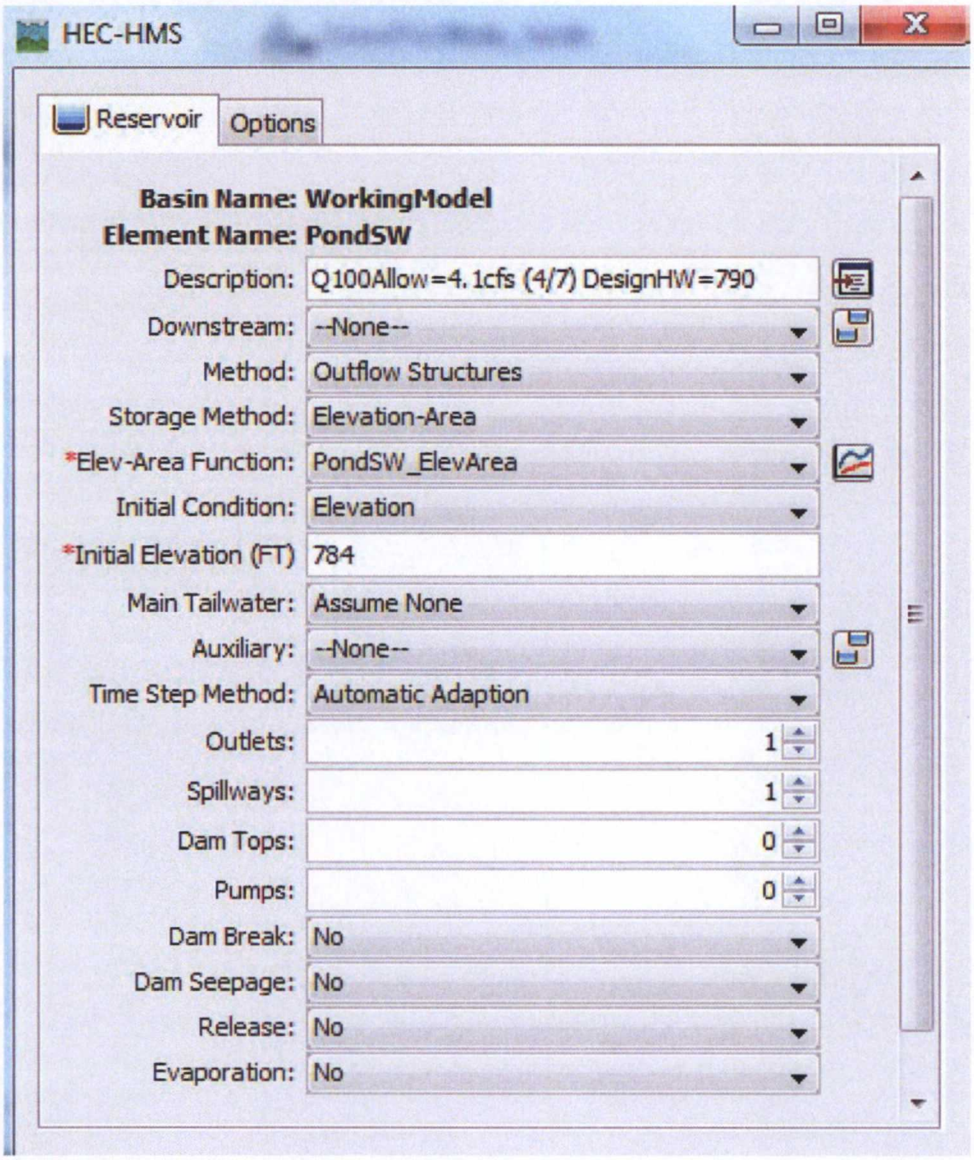
Elevation-Discharge Data

Select a Paired Data

Select | Table | Graph

Elevation (FT)	Discharge (CFS)
787.00	0.0
788.43	3.0
789.30	6.0
790.33	9.0
790.75	10.0
792.00	15.0

Pond 2 (Southwest Pond) input data



Elevation-Area Data

Select | Table | Graph

Elevation (FT)	Area (AC)
783.75	0.0010
783.99	0.0011
784.00	1.0700
785.00	1.1400
787.00	1.2900
789.00	1.4500
791.00	1.6100

Outlet structure data

Reservoir | Outlet 1 | Options

Basin Name: WorkingModel

Element Name: PondSW

Method: Orifice Outlet

Direction: Main

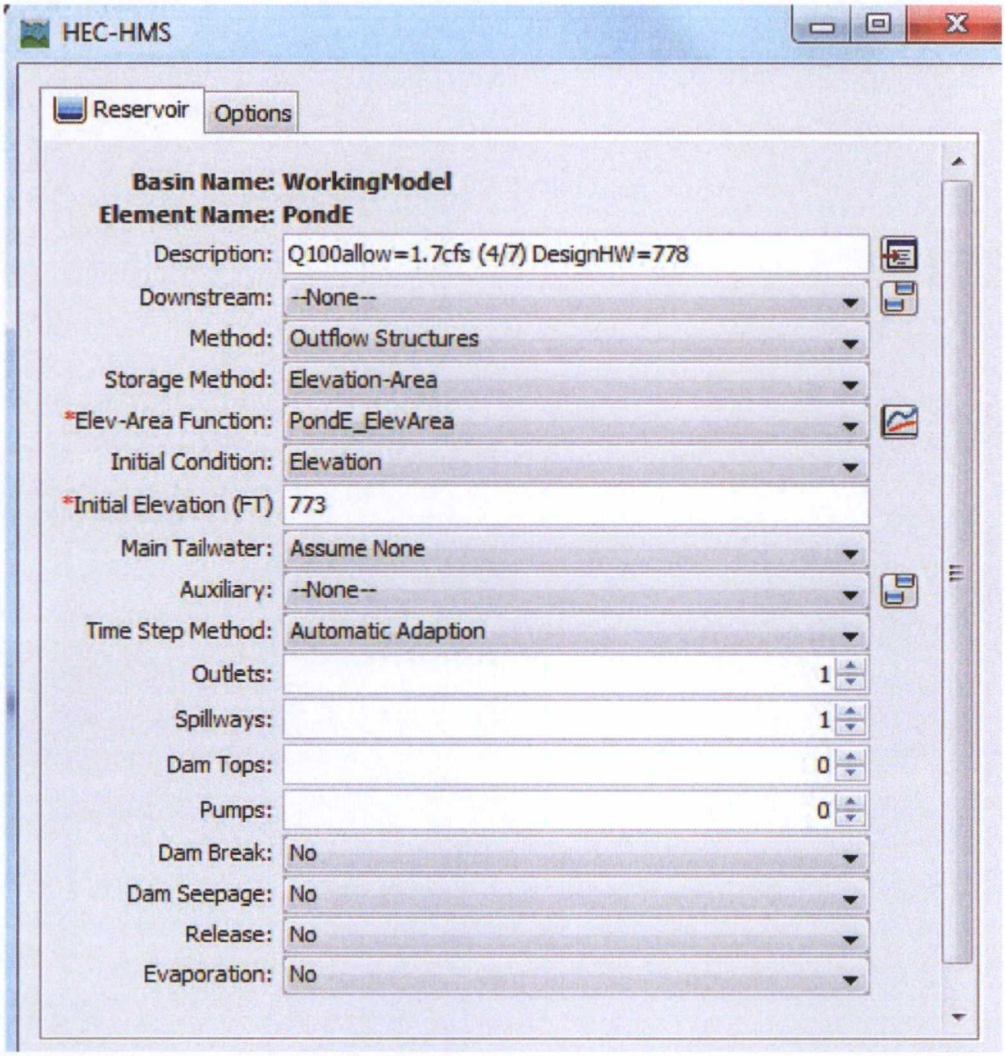
Number Barrels: 1

*Center Elevation (FT) 784.08

*Area (FT2) 0.349

*Coefficient: 0.6

Pond 3 (Southeast Pond) input data



Select a Paired Data

Select | Table | Graph

Elevation (FT)	Area (AC)
775.60	0.00100
775.99	0.00110
776.00	0.45000
778.00	0.58000
780.00	0.72000
781.00	0.79000

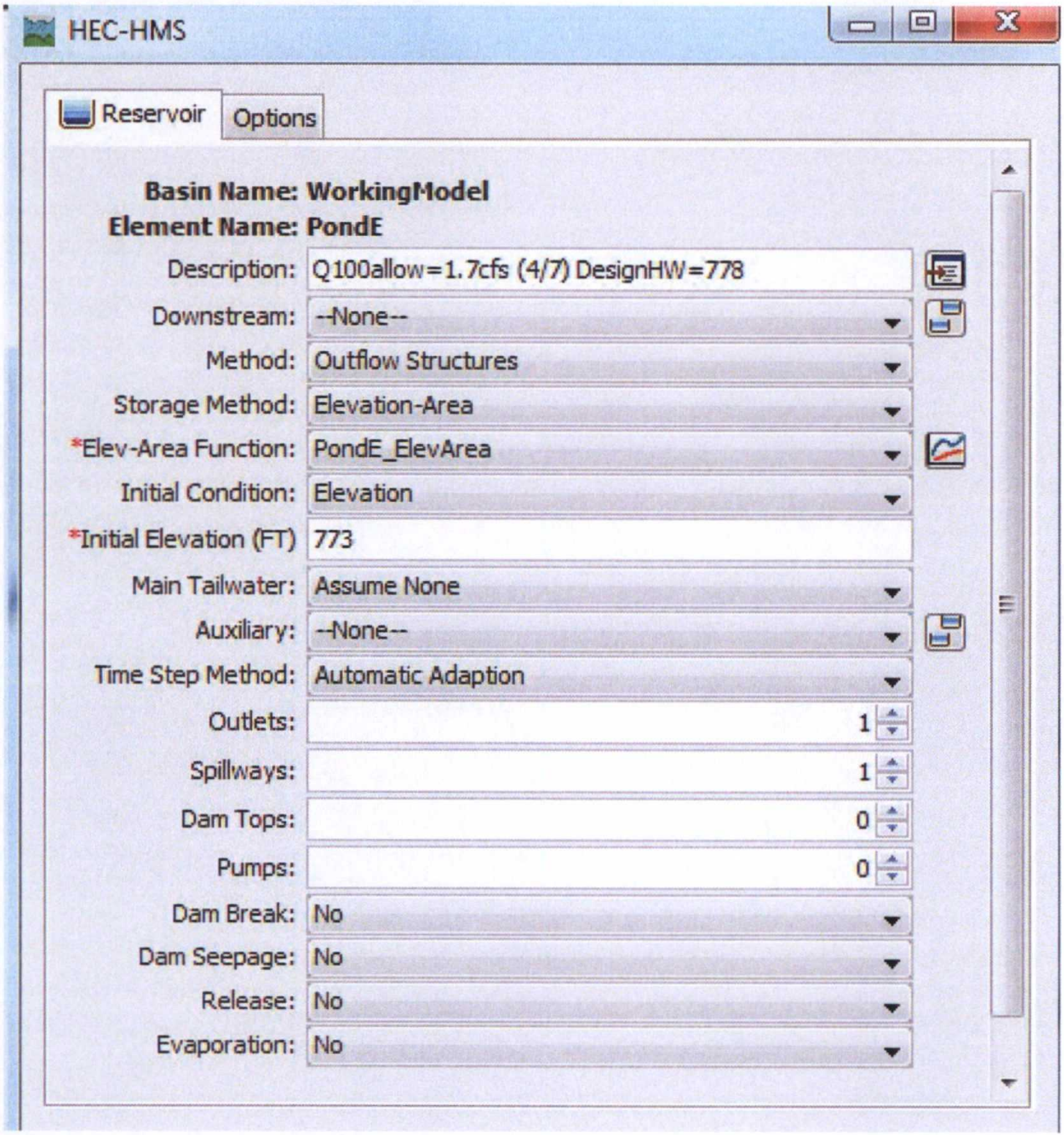
Outlet structure data

Reservoir | Outlet 1 | Options

Basin Name: WorkingModel
Element Name: PondSE

Method: Orifice Outlet
Direction: Main
Number Barrels: 1
*Center Elevation (FT) 775.8
*Area (FT2) 0.126
*Coefficient: 0.6

Pond 4 (East Pond) input data



HEC-HMS

Reservoir | Options

Basin Name: WorkingModel
Element Name: PondE

Description:	Q100allow=1.7cfs (4/7) DesignHW=778
Downstream:	--None--
Method:	Outflow Structures
Storage Method:	Elevation-Area
*Elev-Area Function:	PondE_ElevArea
Initial Condition:	Elevation
*Initial Elevation (FT)	773
Main Tailwater:	Assume None
Auxiliary:	--None--
Time Step Method:	Automatic Adaption
Outlets:	1
Spillways:	1
Dam Tops:	0
Pumps:	0
Dam Break:	No
Dam Seepage:	No
Release:	No
Evaporation:	No

HEC-HMS: post-project conditions

April 10, 2014

Elevation-area data

Select a Paired Data

Select | Table | Graph

Elevation (FT)	Area (AC)
772.60	0.0010
772.99	0.0011
773.00	0.6200
775.00	0.7100
777.00	0.8100
778.00	0.8600
779.00	0.9100

Outlet structure data

Reservoir | Outlet 1 | Options

Basin Name: **WorkingModel**
Element Name: **PondE**
Method: Orifice Outlet
Direction: Main
Number Barrels: 1
*Center Elevation (FT) 772.83
*Area (FT2) 0.165
*Coefficient: 0.6

POST-PROJECT CONDITIONS
STORMWATER DETENTION PONDS
AND DIRECT TO OFFSITE DRAINAGE AREAS

HEC-HMS OUTPUT

HEC-HMS: post-project conditions April 10, 2014

Global Summary Results for Run "100yr"

Project: MIG Simulation Run: 100yr

Start of Run: 01Jan2011, 00:00 Basin Model: WorkingModel
End of Run: 05Jan2011, 00:00 Meteorologic Model: 100 yr
Compute Time: 10Apr2014, 16:14:33 Control Specifications: Control 1

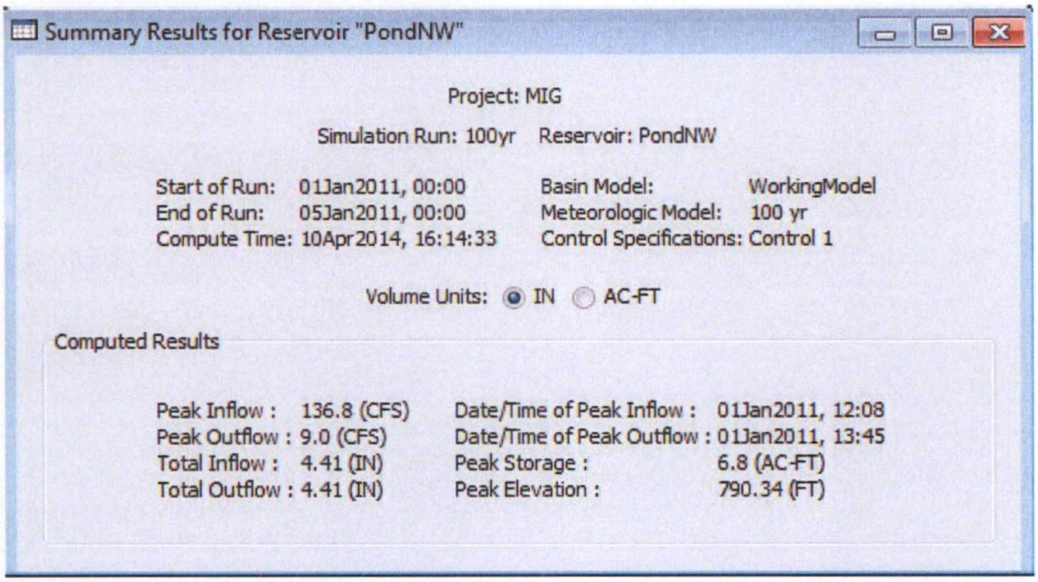
Show Elements: All Elements Volume Units: IN AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BasinNW	0.0479	136.8	01Jan2011, 12:08	4.41
PondNW	0.0479	9.0	01Jan2011, 13:45	4.41
DrainbasinSW	0.0323	105.5	01Jan2011, 12:08	5.41
PondSW	0.0323	3.7	01Jan2011, 15:39	5.35
DrainbasinE	0.0132	46.3	01Jan2011, 12:06	5.41
PondE	0.0132	1.5	01Jan2011, 15:36	5.41
DrainbasinSE	0.0092	37.6	01Jan2011, 12:03	5.41
PondSE	0.0092	1.1	01Jan2011, 15:25	5.41
DirectToOffsite_SouthCentral	0.0037	13.3	01Jan2011, 11:59	3.67
DirectToOffsite_FarEast	0.0006	3.0	01Jan2011, 11:58	5.41
DirectToOffsite_North	0.0044	21.9	01Jan2011, 11:58	5.41
DirectToOffsite_Southeast	0.0021	6.9	01Jan2011, 11:59	3.36

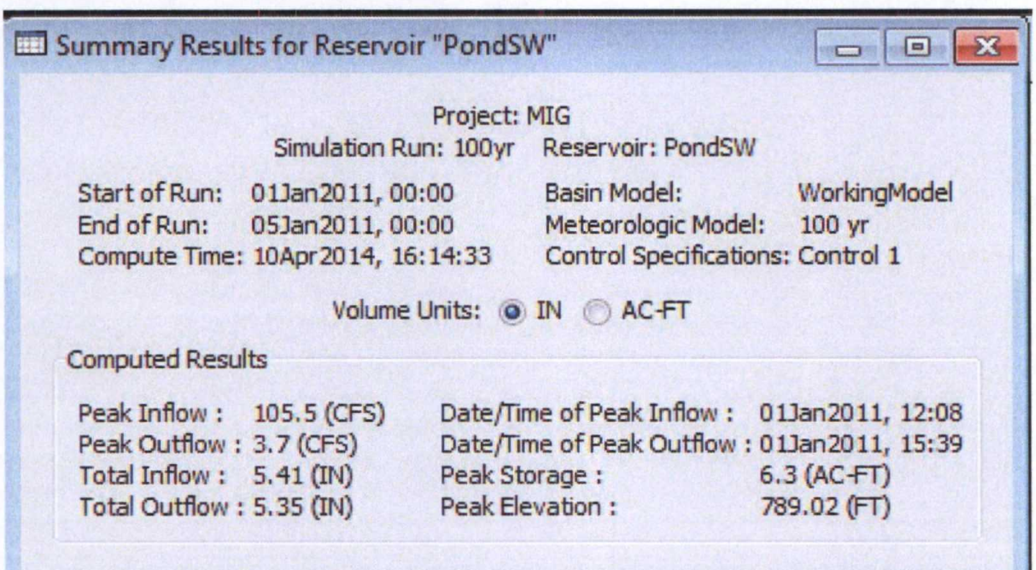
HEC-HMS: post-project conditions

April 10, 2014

Pond 1 (Northwest Pond) results



Pond 2 (Southwest Pond) results



Pond 3 (Southeast Pond) results

Summary Results for Reservoir "PondSE"

Project: MIG

Simulation Run: 100yr Reservoir: PondSE

Start of Run:	01Jan2011, 00:00	Basin Model:	WorkingModel
End of Run:	05Jan2011, 00:00	Meteorologic Model:	100 yr
Compute Time:	10Apr2014, 16:14:33	Control Specifications:	Control 1

Volume Units: (•) IN ( ) AC-FT

Computed Results

Peak Inflow :	37.6 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 12:03
Peak Outflow :	1.1 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 15:25
Total Inflow :	5.41 (IN)	Peak Storage :	1.7 (AC-FT)
Total Outflow :	5.41 (IN)	Peak Elevation :	779.05 (FT)

Pond 4 (East Pond) results

Summary Results for Reservoir "PondE"

Project: MIG

Simulation Run: 100yr Reservoir: PondE

Start of Run:	01Jan2011, 00:00	Basin Model:	WorkingModel
End of Run:	05Jan2011, 00:00	Meteorologic Model:	100 yr
Compute Time:	10Apr2014, 16:14:33	Control Specifications:	Control 1

Volume Units: (•) IN ( ) AC-FT

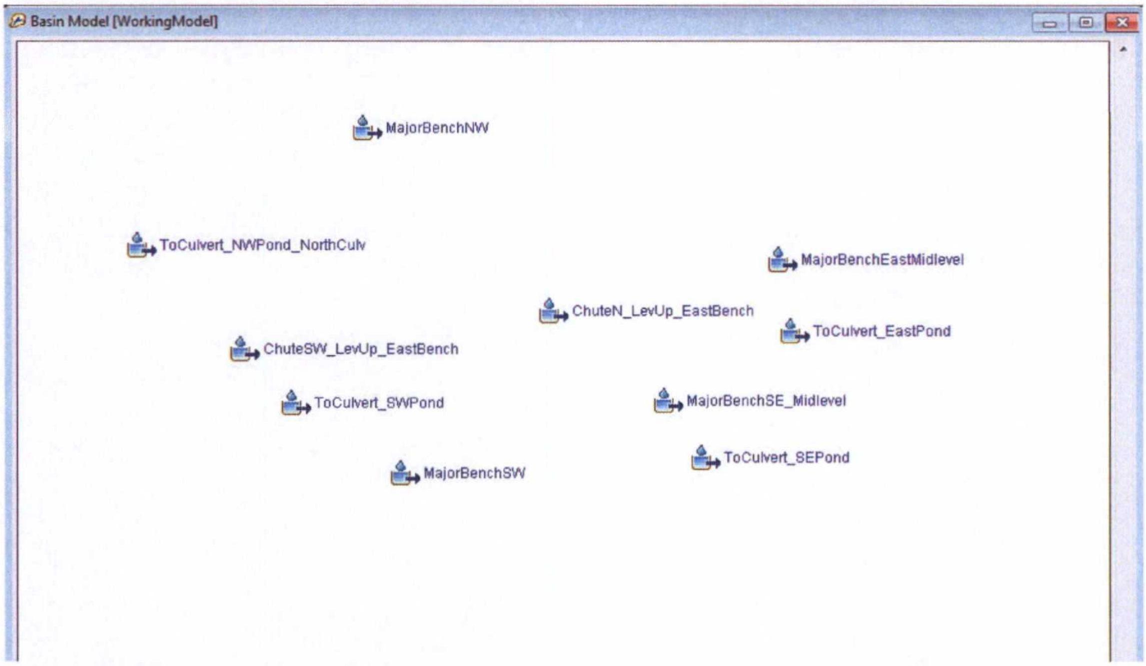
Computed Results

Peak Inflow :	46.3 (CFS)	Date/Time of Peak Inflow :	01Jan2011, 12:06
Peak Outflow :	1.5 (CFS)	Date/Time of Peak Outflow :	01Jan2011, 15:36
Total Inflow :	5.41 (IN)	Peak Storage :	2.5 (AC-FT)
Total Outflow :	5.41 (IN)	Peak Elevation :	776.53 (FT)

SELECTED DRAINAGE AREAS FOR UPLAND CONVEYANCE FEATURES

HEC-HMS INPUT

Note: This HEC-HMS model contains drainage area simulations developed to calculate peak design flows for selected upland stormwater conveyance features (drainage benches, downchutes, culverts). It is not intended to be a comprehensive routing model of the upland conveyance system, nor were all conveyance features peak flows calculated via this model. Peak design flows for many conveyance features, especially those with smaller drainage areas, were calculated using a unit area / peak flow ratio approach developed in Attachment 9.



Subbasin Area [WorkingModel]

Show Elements: All Elements Sorting: Hydrologic

Subbasin	Area (MI2)
ChuteSW_LevUp_E...	0.00509
ChuteN_LevUp_Ea...	0.00387
MajorBenchNW	0.0173
MajorBenchSW	0.009
MajorBenchSE_Midl...	0.0046
MajorBenchEastMid...	0.0071
ToCulvert_NWPon...	0.0194
ToCulvert_SWPond	0.0259
ToCulvert_SEPond	0.00859
ToCulvert_EastPond	0.01297

Curve Number Loss [WorkingModel]

Show Elements: All Elements Sorting: Hydrologic

Subbasin	Initial Abstraction (IN)	Curve Number	Impervious (%)
ChuteSW_LevUp_E...		89	0.0
ChuteN_LevUp_Ea...		89	0.0
MajorBenchNW		89	0.0
MajorBenchSW		89	0.0
MajorBenchSE_Midl...		89	0.0
MajorBenchEastMid...		89	0.0
ToCulvert_NWPon...		89	0.0
ToCulvert_SWPond		89	0.0
ToCulvert_SEPond		89	0.0
ToCulvert_EastPond		89	0.0

SCS Transform[WorkingModel]

Show Elements: All Elements Sorting: Hydrologic

Subbasin	Lag Time (MIN)
ChuteSW_LevUp_E...	15
ChuteN_LevUp_Ea...	13
MajorBenchNW	15
MajorBenchSW	15
MajorBenchSE_Midl...	9
MajorBenchEastMid...	13
ToCulvert_NWPon...	15
ToCulvert_SWPond	15
ToCulvert_SEPond	9
ToCulvert_EastPond	13

SELECTED DRAINAGE AREAS
FOR UPLAND CONVEYANCE FEATURES

HEC-HMS OUTPUT

Global Summary Results for Run "100yr"

Project: UplandDrainage Simulation Run: 100yr

Start of Run: 01Jan2011, 00:00 Basin Model: WorkingModel
End of Run: 05Jan2011, 00:00 Meteorologic Model: 100 yr
Compute Time: 10Apr2014, 16:33:45 Control Specifications: Control 1

Show Elements: All Elements Volume Units: IN AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
ChuteSW_LevUp_EastBench	0.00509	17.2	01Jan2011, 12:07	5.41
ChuteN_LevUp_EastBench	0.00387	14.1	01Jan2011, 12:06	5.41
MajorBenchNW	0.01730	58.5	01Jan2011, 12:07	5.41
MajorBenchSW	0.00900	30.4	01Jan2011, 12:07	5.41
MajorBenchSE_Midlevel	0.00460	19.6	01Jan2011, 12:02	5.41
MajorBenchEastMidlevel	0.00710	25.8	01Jan2011, 12:06	5.41
ToCulvert_NWPond_NorthCulv	0.01940	65.6	01Jan2011, 12:07	5.41
ToCulvert_SWPond	0.02590	87.6	01Jan2011, 12:07	5.41
ToCulvert_SEPond	0.00859	36.6	01Jan2011, 12:02	5.41
ToCulvert_EastPond	0.01297	47.2	01Jan2011, 12:06	5.41

ATTACHMENT 6

Conveyance Feature Design Calculations

(Drainage Benches, Swales and Downchutes)

Table 6-1
Downchute Hydraulic Design Summary

Downchute Name/ Location	Drainage area (acres)	100-year peak flow (cfs)	Slope (%)	Flow depth (ft)	Freeboard (ft)	Flow capacity at 1.5 ft depth (cfs)
1A-1 (west)	4.1	30	7%	0.76	0.74	122
1B-1 (north)	7.7	55	14%	0.86	0.64	172
2A-1 (southwest)	8.5	61	4%	1.24	0.26	92
3-2 (southeast)	2.9	21	10%	0.58	0.92	145
4A-1 (northeast)	1.5	11	15%	0.36	1.14	178

All downchutes have trapezoidal cross section, with 2 foot bottom width and 2:1 side slopes. The minimum depth from downchute bottom to top of adjacent berm is 1.5 feet.

All downchute peak flows computed from drainage area / peak flow equation of Q (cfs) = 7.2 x drainage area (acres). See attachment 8 for development of this equation.

Hydraulics for downchutes 2B-1, 3-1, 4B-1 were not analyzed in detail. It was determined from visual inspection of drainage area and slopes that combinations of design flows/slopes for these downchutes result in less severe design criteria than those listed in table above; therefore these downchutes also have adequate hydraulic capacity.

Table 6-2
Major Bench Hydraulic Design Summary

Major benches are those drainage benches which generally lie at the toe of the landfill side slopes. Because these benches receive incoming flow from downchutes or receive flow from large contributing drainage areas, they were found to have higher 100-year peak flows that necessitated the use of a trapezoidal channel section. Because of the larger drainage areas and higher peak flows of these drainage benches, hydraulic capacity calculations were performed individually for these major benches and are summarized below.

Major Bench Name/ Location	Drainage area (acres)	100-year peak flow (cfs)	Slope (%)	Flow depth (ft)	Free-board (ft)	Flow capacity at 1.5 ft depth (cfs)
1B-7 (northwest)	11.1	59	1.5%	1.34	0.68*	145* (at 2 ft depth)
2A-6 (southwest)	5.8	30	1.5%	0.98	0.52	75
3-4 (southeast midlevel)	2.9	20	2%	0.88	0.62	84
3-7 (southeast low-level)	4.8	35	1.5%	0.94	0.56	103
4A-5 (east midlevel)	4.6	26	1.5%	0.90	0.60	81
4B-1 (east low-level)	3.5	25	1.5%	0.80	0.70	103

For all major benches, the cross section shall be trapezoidal, with a minimum 3 foot bottom width and 3:1 or greater side slopes.
* For all major benches except for 1B-7(Northwest), the depth of the bench (from the channel bottom to the top of the downslope berm) is a minimum of 1.5 feet. For major bench 1B-7, the depth of the bench is 2 feet, to accommodate the higher design flow in this bench.

Given the larger drainage areas for many of these major benches, in some cases peak flows were calculated by constructing a subbasin model specifically for that drainage area in HEC-HMS, instead of using the drainage area-peak flow linear equation used for smaller drainage areas. This included the calculation of a bench-specific lag time, instead of using the default assumption of a very short lag time included in the area-flow generic relationship.

Hydraulic Analysis of "Minor" Drainage Benches

Drainage benches located in the upper slope and midslope region of the site have smaller tributary drainage areas and smaller 100-year peak design flows. These drainage benches are also much more numerous than the "major" drainage benches. Individual hydraulic analyses of all of these benches were not performed. Instead, the hydraulic performance of typical triangular (V-shaped) drainage benches was assessed for longitudinal slopes of 1.5, 2 and 3%. The following section includes the spreadsheet printouts from these analyses.

Drainage areas to minor benches were then visually assessed, and drainage basin delineations were conducted for those minor benches that appeared to have the largest drainage areas. 100-year peak flows were calculated based on the drainage area/peak flow linear relationship established in Attachment 8, or with subbasin-specific HEC-HMS models. These peak flows were then used to verify that the typical triangular drainage bench at slopes ranging from 1.5% to 3% had adequate capacity to convey design flows.

The highest calculated peak flow for a minor bench was found to be 17 cfs, for a minor bench with a slope of 2%. This resulted in a design flow depth of 1.12 feet, and a freeboard of at least 0.38 feet. The hydraulic capacity of the triangular cross section at a depth of 1.5 feet (minimum height of downslope berm) is 38 cfs.

Design/Check: Trapezoidal/Triangular Channel

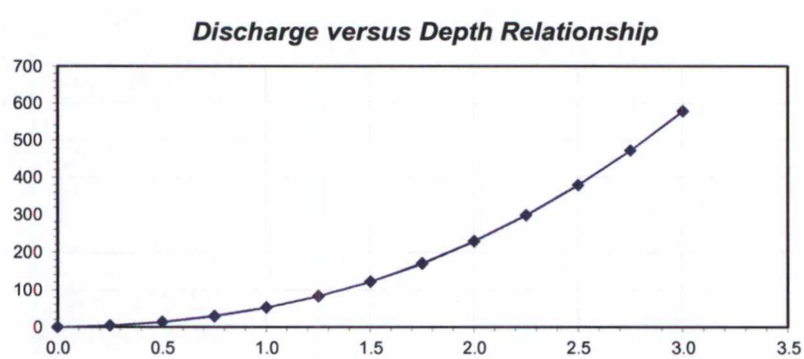
Methodology: Manning's Equation

Project: MIG Dewane landfill

Ditch ID: Downchute 1A-1 (West) - low slope location, for hydraulic capacity calc

Peak Discharge, Q_{max}=	30.00	cfs
Bottom Width, B =	2.00	ft
Left Side Slope, Z_1 =	2.00	horizontal :1 vertical
Right Side Slope, Z_2 =	2.00	horizontal :1 vertical
Manning's Roughness Coeff., n =	0.022	
Longitudinal Channel Slope, S_o =	0.0700	ft/ft

Depth of Flow Y ft	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R=A/P ft	Average Velocity V ft/s	Discharge (Flow Rate) Q=AV ft^3/s	Avg. Tractive Stress τ_o lb/ft^2	Comments
0.00	0.00	2.00	0.00	0.18	0.00	0.00	
0.25	0.63	3.12	0.20	6.15	3.86	0.88	
0.50	1.50	4.24	0.35	8.97	13.49	1.55	
0.75	2.63	5.36	0.49	11.14	29.30	2.14	
1.00	4.00	6.48	0.62	13.00	52.07	2.70	
1.25	5.63	7.59	0.74	14.68	82.62	3.24	
1.50	7.50	8.71	0.86	16.22	121.74	3.76	
1.75	9.63	9.83	0.98	17.68	170.19	4.28	
2.00	12.00	10.95	1.10	19.06	228.73	4.79	
2.25	14.63	12.06	1.21	20.38	298.07	5.30	
2.50	17.50	13.18	1.33	21.65	378.91	5.80	
2.75	20.63	14.30	1.44	22.88	471.91	6.30	
3.00	24.00	15.42	1.56	24.07	577.75	6.80	
0.76	2.68	5.40	0.50	11.22	30.01	2.16	DESIGN Q



Design/Check: Trapezoidal/Triangular Channel

Methodology: Manning's Equation

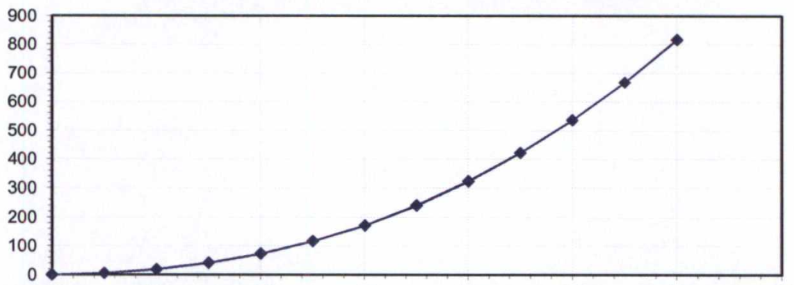
Project: MIG Dewane landfill

Ditch ID: Downchute 1B-1 (North) - minimum slope location, for hydraulic capacity analysis

Peak Discharge, Q_{max}=	55.00	cfs
Bottom Width, B =	2.00	ft
Left Side Slope, Z_1 =	2.00	horizontal :1 vertical
Right Side Slope, Z_2 =	2.00	horizontal :1 vertical
Manning's Roughness Coeff., n =	0.022	
Longitudinal Channel Slope, S_o =	0.1400	ft/ft

Depth of Flow Y ft	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R=A/P ft	Average Velocity V ft/s	Discharge (Flow Rate) Q=AV ft^3/s	Avg. Tractive Stress τ_o lb/ft^2	Comments
0.00	0.00	2.00	0.00	0.25	0.00	0.01	
0.25	0.63	3.12	0.20	8.69	5.46	1.76	
0.50	1.50	4.24	0.35	12.69	19.08	3.10	
0.75	2.63	5.36	0.49	15.76	41.43	4.29	
1.00	4.00	6.48	0.62	18.39	73.63	5.40	
1.25	5.63	7.59	0.74	20.76	116.84	6.48	
1.50	7.50	8.71	0.86	22.94	172.16	7.53	
1.75	9.63	9.83	0.98	25.00	240.69	8.56	
2.00	12.00	10.95	1.10	26.95	323.48	9.58	
2.25	14.63	12.06	1.21	28.82	421.54	10.59	
2.50	17.50	13.18	1.33	30.62	535.86	11.60	
2.75	20.63	14.30	1.44	32.36	667.39	12.60	
3.00	24.00	15.42	1.56	34.04	817.06	13.60	
0.86	3.20	5.85	0.55	16.95	54.23	4.78	DESIGN Q

Discharge versus Depth Relationship



Design/Check: Trapezoidal/Triangular Channel

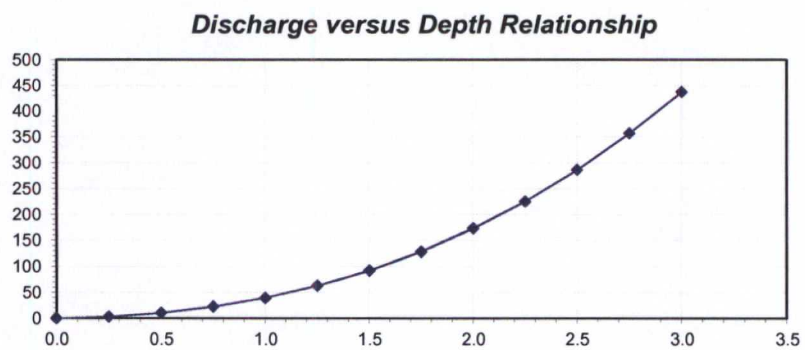
Methodology: Manning's Equation

Project: MIG Dewane landfill

Ditch ID: Downchute 2A-1 (Southwest) - low slope location, for hydraulic capacity analysis

Peak Discharge, Q_{max}=	61.00	cfs
Bottom Width, B =	2.00	ft
Left Side Slope, Z_1 =	2.00	horizontal :1 vertical
Right Side Slope, Z_2 =	2.00	horizontal :1 vertical
Manning's Roughness Coeff., n =	0.022	
Longitudinal Channel Slope, S_o =	0.0400	ft/ft

Depth of Flow Y ft	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R=A/P ft	Average Velocity V ft/s	Discharge (Flow Rate) Q=AV ft^3/s	Avg. Tractive Stress τ_o lb/ft^2	Comments
0.00	0.00	2.00	0.00	0.14	0.00	0.00	
0.25	0.63	3.12	0.20	4.65	2.92	0.50	
0.50	1.50	4.24	0.35	6.78	10.20	0.89	
0.75	2.63	5.36	0.49	8.42	22.15	1.22	
1.00	4.00	6.48	0.62	9.83	39.36	1.54	
1.25	5.63	7.59	0.74	11.09	62.45	1.85	
1.50	7.50	8.71	0.86	12.26	92.02	2.15	
1.75	9.63	9.83	0.98	13.36	128.66	2.45	
2.00	12.00	10.95	1.10	14.40	172.91	2.74	
2.25	14.63	12.06	1.21	15.40	225.32	3.03	
2.50	17.50	13.18	1.33	16.37	286.43	3.31	
2.75	20.63	14.30	1.44	17.30	356.73	3.60	
3.00	24.00	15.42	1.56	18.20	436.74	3.89	
1.24	5.56	7.55	0.74	11.04	61.35	1.84	DESIGN Q



Design/Check: Trapezoidal/Triangular Channel

Methodology: Manning's Equation

Project: MIG Dewane landfill

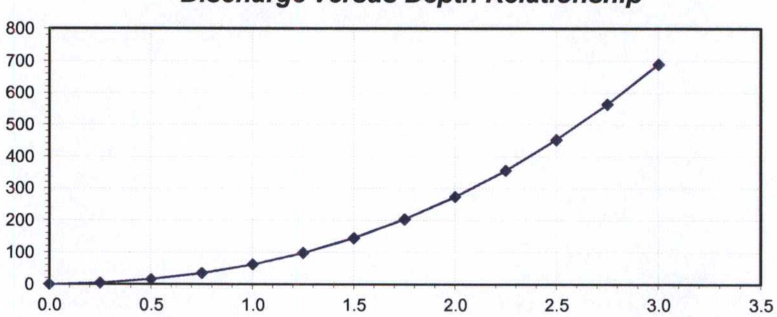
Ditch ID: Downchute3-2 (Southeast)

Peak Discharge, Q_{max}=	21.00	cfs
Bottom Width, B =	2.00	ft
Left Side Slope, Z_1 =	2.00	horizontal :1 vertical
Right Side Slope, Z_2 =	2.00	horizontal :1 vertical
Manning's Roughness Coeff., n =	0.022	
Longitudinal Channel Slope, S_o =	0.1000	ft/ft

Slope is consistent, so I will not analyze separate slopes fo

Depth of Flow Y ft	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R=A/P ft	Average Velocity V ft/s	Discharge (Flow Rate) Q=AV ft^3/s	Avg. Tractive Stress τ_o lb/ft^2	Comments
0.00	0.00	2.00	0.00	0.21	0.00	0.01	
0.25	0.63	3.12	0.20	7.35	4.61	1.25	
0.50	1.50	4.24	0.35	10.73	16.12	2.21	
0.75	2.63	5.36	0.49	13.32	35.02	3.06	
1.00	4.00	6.48	0.62	15.54	62.23	3.86	
1.25	5.63	7.59	0.74	17.54	98.75	4.63	
1.50	7.50	8.71	0.86	19.39	145.50	5.38	
1.75	9.63	9.83	0.98	21.13	203.42	6.11	
2.00	12.00	10.95	1.10	22.78	273.39	6.84	
2.25	14.63	12.06	1.21	24.36	356.27	7.57	
2.50	17.50	13.18	1.33	25.88	452.88	8.29	
2.75	20.63	14.30	1.44	27.35	564.04	9.00	
3.00	24.00	15.42	1.56	28.77	690.54	9.71	
0.58	1.83	4.59	0.40	11.60	21.27	2.49	DESIGN Q

Discharge versus Depth Relationship



Design/Check: Trapezoidal/Triangular Channel

Methodology: Manning's Equation

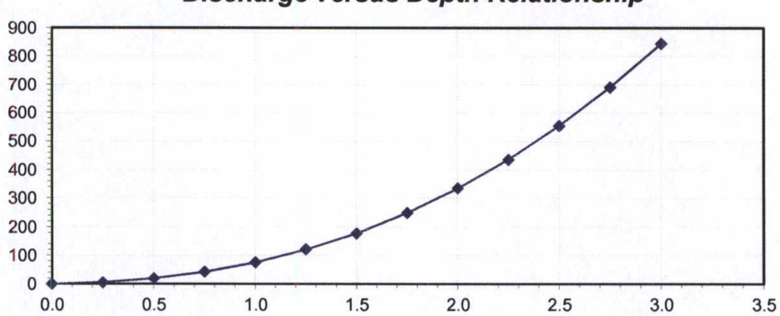
Project: MIG Dewane landfill

Ditch ID: Downchute 4A-1 (Northeast)

Peak Discharge, Q_{max}=	10.50	cfs
Bottom Width, B =	2.00	ft
Left Side Slope, Z_1 =	2.00	horizontal :1 vertical
Right Side Slope, Z_2 =	2.00	horizontal :1 vertical
Manning's Roughness Coeff., n =	0.022	
Longitudinal Channel Slope, S_o =	0.1500	ft/ft

Depth of Flow Y ft	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R=A/P ft	Average Velocity V ft/s	Discharge (Flow Rate) Q=AV ft^3/s	Avg. Tractive Stress τ_o lb/ft^2	Comments
0.00	0.00	2.00	0.00	0.26	0.00	0.01	
0.25	0.63	3.12	0.20	9.00	5.65	1.88	
0.50	1.50	4.24	0.35	13.14	19.75	3.32	
0.75	2.63	5.36	0.49	16.31	42.89	4.59	
1.00	4.00	6.48	0.62	19.04	76.22	5.79	
1.25	5.63	7.59	0.74	21.48	120.94	6.94	
1.50	7.50	8.71	0.86	23.75	178.20	8.06	
1.75	9.63	9.83	0.98	25.87	249.14	9.17	
2.00	12.00	10.95	1.10	27.90	334.83	10.26	
2.25	14.63	12.06	1.21	29.83	436.33	11.35	
2.50	17.50	13.18	1.33	31.69	554.66	12.43	
2.75	20.63	14.30	1.44	33.49	690.81	13.50	
3.00	24.00	15.42	1.56	35.24	845.74	14.57	
0.36	0.98	3.61	0.27	10.99	10.76	2.54	DESIGN Q

Discharge versus Depth Relationship



Design/Check: Trapezoidal/Triangular Channel

Methodology: Manning's Equation

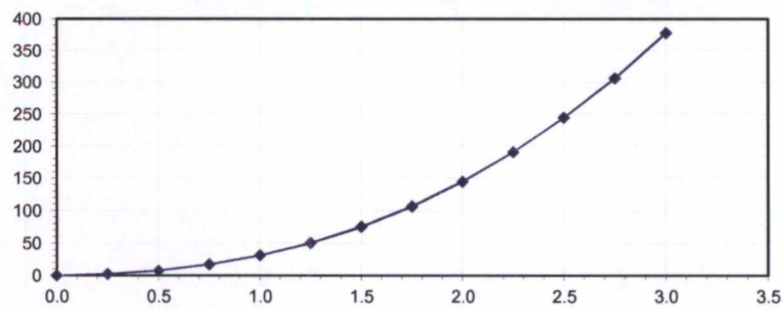
Project: MIG Dewane landfill

Ditch ID: Major Bench 1B-7 (Northwest)

Peak Discharge, Q_{max}=	59.00	cfs
Bottom Width, B =	3.00	ft
Left Side Slope, Z_1 =	5.00	horizontal :1 vertical
Right Side Slope, Z_2 =	3.00	horizontal :1 vertical
Manning's Roughness Coeff., n =	0.030	
Longitudinal Channel Slope, S_o =	0.0150	ft/ft

Depth of Flow Y ft	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R=A/P ft	Average Velocity V ft/s	Discharge (Flow Rate) Q=AV ft^3/s	Avg. Tractive Stress τ_o lb/ft^2	Comments
0.00	0.00	3.01	0.00	0.06	0.00	0.00	
0.25	1.00	5.07	0.20	2.07	2.07	0.19	
0.50	2.51	7.14	0.35	3.03	7.58	0.33	
0.75	4.51	9.20	0.49	3.78	17.03	0.46	
1.00	7.01	11.27	0.62	4.43	31.05	0.58	
1.25	10.01	13.33	0.75	5.02	50.28	0.70	
1.50	13.51	15.40	0.88	5.57	75.30	0.82	
1.75	17.51	17.46	1.00	6.09	106.68	0.94	
2.00	22.01	19.53	1.13	6.59	144.98	1.05	
2.25	27.01	21.59	1.25	7.06	190.72	1.17	
2.50	32.50	23.65	1.37	7.52	244.40	1.29	
2.75	38.50	25.72	1.50	7.96	306.53	1.40	
3.00	45.00	27.78	1.62	8.39	377.58	1.52	
1.34	11.20	14.07	0.80	5.22	58.53	0.75	DESIGN Q

Discharge versus Depth Relationship



Design/Check: Trapezoidal/Triangular Channel

Methodology: Manning's Equation

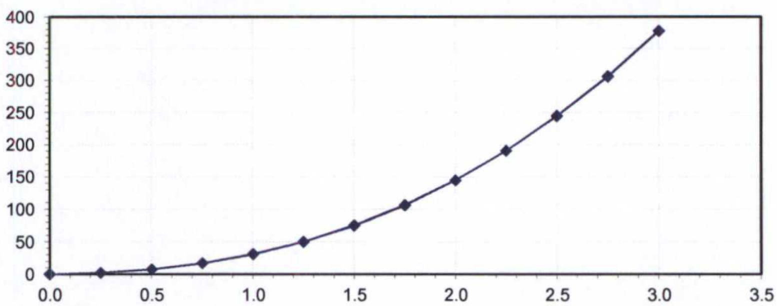
Project: MIG Dewane landfill

Ditch ID: Major Bench 2A-6 (Southwest)

Peak Discharge, Q_{max}=	30.00	cfs
Bottom Width, B =	3.00	ft
Left Side Slope, Z_1 =	5.00	horizontal :1 vertical
Right Side Slope, Z_2 =	3.00	horizontal :1 vertical
Manning's Roughness Coeff., n =	0.030	
Longitudinal Channel Slope, S_o =	0.0150	ft/ft

Depth of Flow Y ft	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R=A/P ft	Average Velocity V ft/s	Discharge (Flow Rate) Q=AV ft^3/s	Avg. Tractive Stress τ_o lb/ft^2	Comments
0.00	0.00	3.01	0.00	0.06	0.00	0.00	
0.25	1.00	5.07	0.20	2.07	2.07	0.19	
0.50	2.51	7.14	0.35	3.03	7.58	0.33	
0.75	4.51	9.20	0.49	3.78	17.03	0.46	
1.00	7.01	11.27	0.62	4.43	31.05	0.58	
1.25	10.01	13.33	0.75	5.02	50.28	0.70	
1.50	13.51	15.40	0.88	5.57	75.30	0.82	
1.75	17.51	17.46	1.00	6.09	106.68	0.94	
2.00	22.01	19.53	1.13	6.59	144.98	1.05	
2.25	27.01	21.59	1.25	7.06	190.72	1.17	
2.50	32.50	23.65	1.37	7.52	244.40	1.29	
2.75	38.50	25.72	1.50	7.96	306.53	1.40	
3.00	45.00	27.78	1.62	8.39	377.58	1.52	
0.98	6.78	11.10	0.61	4.38	29.70	0.57	DESIGN Q

Discharge versus Depth Relationship



Design/Check: Trapezoidal/Triangular Channel

Methodology: Manning's Equation

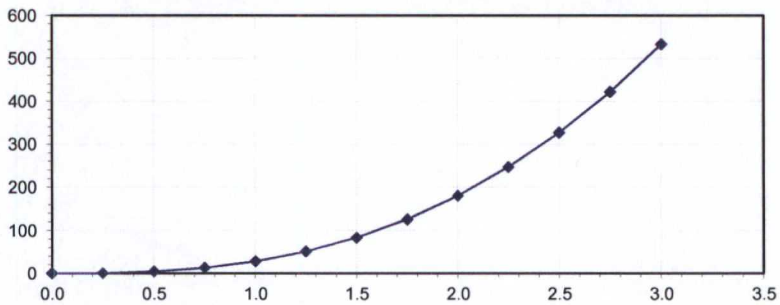
Project: MIG Dewane landfill

Ditch ID: Major Bench 3-4 (Southeast Mid-level)

Peak Discharge, Q_{max}=	20.00	cfs
Bottom Width, B =	0.00	ft
Left Side Slope, Z_1 =	10.00	horizontal :1 vertical
Right Side Slope, Z_2 =	3.00	horizontal :1 vertical
Manning's Roughness Coeff., n =	0.030	
Longitudinal Channel Slope, S_o =	0.0200	ft/ft

Depth of Flow Y ft	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R=A/P ft	Average Velocity V ft/s	Discharge (Flow Rate) Q=AV ft^3/s	Avg. Tractive Stress τ_o lb/ft^2	Comments
0.00	0.00	0.01	0.00	0.04	0.00	0.00	
0.25	0.41	3.32	0.12	1.74	0.71	0.15	
0.50	1.63	6.62	0.25	2.76	4.50	0.31	
0.75	3.66	9.92	0.37	3.61	13.24	0.46	
1.00	6.51	13.22	0.49	4.38	28.50	0.61	
1.25	10.17	16.52	0.62	5.08	51.64	0.77	
1.50	14.63	19.82	0.74	5.74	83.95	0.92	
1.75	19.92	23.13	0.86	6.36	126.61	1.07	
2.00	26.01	26.43	0.98	6.95	180.74	1.23	
2.25	32.91	29.73	1.11	7.52	247.41	1.38	
2.50	40.63	33.03	1.23	8.06	327.64	1.54	
2.75	49.16	36.33	1.35	8.59	422.43	1.69	
3.00	58.50	39.64	1.48	9.11	532.72	1.84	
0.88	5.03	11.63	0.43	4.02	20.23	0.54	DESIGN Q

Discharge versus Depth Relationship



Design/Check: Trapezoidal/Triangular Channel

Methodology: Manning's Equation

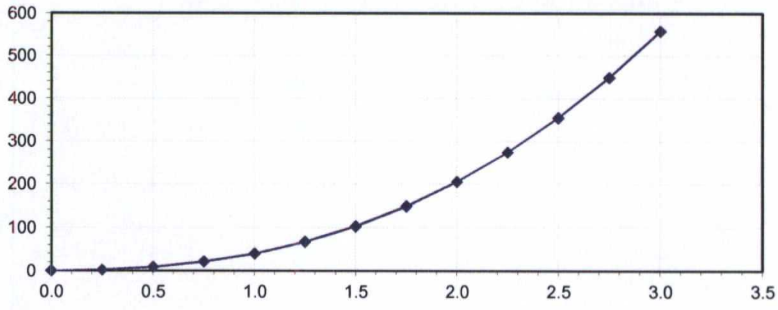
Project: MIG Dewane landfill

Ditch ID: Major Bench 3-7 (Southeast Low-level)

Peak Discharge, Q_{max} =	35.00	cfs
Bottom Width, B =	3.00	ft
Left Side Slope, Z_1 =	10.00	horizontal :1 vertical
Right Side Slope, Z_2 =	3.00	horizontal :1 vertical
Manning's Roughness Coeff., n =	0.030	
Longitudinal Channel Slope, S_o =	0.0150	ft/ft

Depth of Flow Y ft	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R=A/P ft	Average Velocity V ft/s	Discharge (Flow Rate) Q=AV ft^3/s	Avg. Tractive Stress τ_o lb/ft^2	Comments
0.00	0.00	3.01	0.00	0.06	0.00	0.00	
0.25	1.16	6.32	0.18	1.97	2.29	0.17	
0.50	3.13	9.62	0.33	2.88	9.02	0.30	
0.75	5.92	12.92	0.46	3.61	21.37	0.43	
1.00	9.51	16.22	0.59	4.26	40.52	0.55	
1.25	13.92	19.52	0.71	4.85	67.55	0.67	
1.50	19.14	22.82	0.84	5.41	103.49	0.78	
1.75	25.17	26.13	0.96	5.93	149.31	0.90	
2.00	32.01	29.43	1.09	6.43	205.94	1.02	
2.25	39.66	32.73	1.21	6.91	274.26	1.13	
2.50	48.13	36.03	1.34	7.38	355.14	1.25	
2.75	57.41	39.33	1.46	7.83	449.39	1.37	
3.00	67.50	42.64	1.58	8.26	557.82	1.48	
0.94	8.56	15.42	0.56	4.11	35.19	0.52	DESIGN Q

Discharge versus Depth Relationship



Design/Check: Trapezoidal/Triangular Channel

Methodology: Manning's Equation

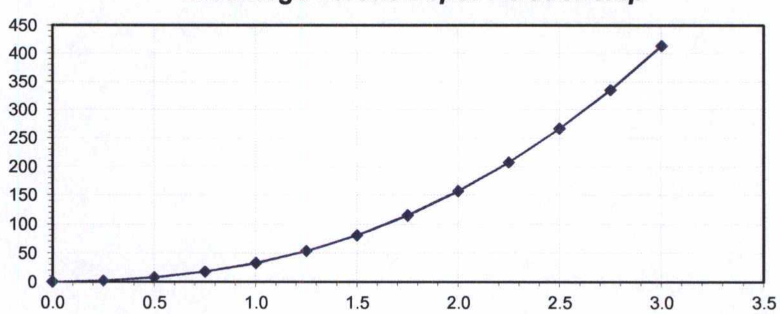
Project: MIG Dewane landfill

Ditch ID: Major Bench 4A-5 (East Mid-level)

Peak Discharge, Q_{max}=	26.00	cfs
Bottom Width, B =	3.00	ft
Left Side Slope, Z_1 =	6.00	horizontal :1 vertical
Right Side Slope, Z_2 =	3.00	horizontal :1 vertical
Manning's Roughness Coeff., n =	0.030	
Longitudinal Channel Slope, S_o =	0.0150	ft/ft

Depth of Flow Y ft	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R=A/P ft	Average Velocity V ft/s	Discharge (Flow Rate) Q=AV ft^3/s	Avg. Tractive Stress τ_o lb/ft^2	Comments
0.00	0.00	3.01	0.00	0.06	0.00	0.00	
0.25	1.04	5.32	0.19	2.04	2.12	0.18	
0.50	2.63	7.63	0.34	2.99	7.87	0.32	
0.75	4.79	9.94	0.48	3.74	17.90	0.45	
1.00	7.51	12.25	0.61	4.39	32.95	0.57	
1.25	10.79	14.56	0.74	4.98	53.74	0.69	
1.50	14.63	16.87	0.87	5.53	80.95	0.81	
1.75	19.04	19.18	0.99	6.05	115.23	0.93	
2.00	24.01	21.49	1.12	6.55	157.21	1.05	
2.25	29.54	23.80	1.24	7.02	207.49	1.16	
2.50	35.63	26.11	1.36	7.48	266.63	1.28	
2.75	42.28	28.42	1.49	7.93	335.22	1.39	
3.00	49.50	30.74	1.61	8.36	413.78	1.51	
0.90	6.35	11.32	0.56	4.13	26.23	0.52	DESIGN Q

Discharge versus Depth Relationship



Design/Check: Trapezoidal/Triangular Channel

Methodology: Manning's Equation

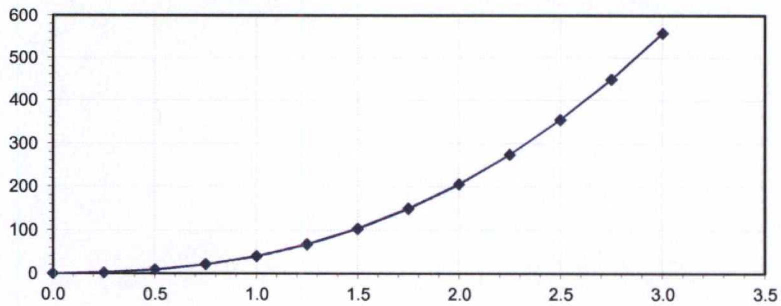
Project: MIG Dewane landfill

Ditch ID: Major Bench 4B-1 (East Low-level)

Peak Discharge, Q_{max}=	25.00	cfs
Bottom Width, B =	3.00	ft
Left Side Slope, Z_1 =	10.00	horizontal :1 vertical
Right Side Slope, Z_2 =	3.00	horizontal :1 vertical
Manning's Roughness Coeff., n =	0.030	
Longitudinal Channel Slope, S_o =	0.0150	ft/ft

Depth of Flow Y ft	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R=A/P ft	Average Velocity V ft/s	Discharge (Flow Rate) Q=AV ft^3/s	Avg. Tractive Stress τ_o lb/ft^2	Comments
0.00	0.00	3.01	0.00	0.06	0.00	0.00	
0.25	1.16	6.32	0.18	1.97	2.29	0.17	
0.50	3.13	9.62	0.33	2.88	9.02	0.30	
0.75	5.92	12.92	0.46	3.61	21.37	0.43	
1.00	9.51	16.22	0.59	4.26	40.52	0.55	
1.25	13.92	19.52	0.71	4.85	67.55	0.67	
1.50	19.14	22.82	0.84	5.41	103.49	0.78	
1.75	25.17	26.13	0.96	5.93	149.31	0.90	
2.00	32.01	29.43	1.09	6.43	205.94	1.02	
2.25	39.66	32.73	1.21	6.91	274.26	1.13	
2.50	48.13	36.03	1.34	7.38	355.14	1.25	
2.75	57.41	39.33	1.46	7.83	449.39	1.37	
3.00	67.50	42.64	1.58	8.26	557.82	1.48	
0.80	6.56	13.57	0.48	3.75	24.57	0.45	DESIGN Q

Discharge versus Depth Relationship



Design/Check: Trapezoidal/Triangular Channel

Methodology: Manning's Equation

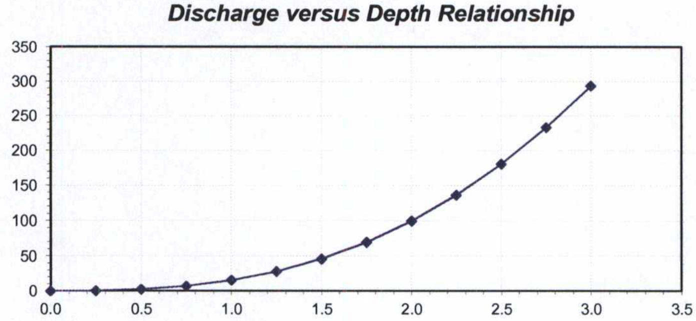
Project: MIG Dewane landfill

Ditch ID: Typical bench at 3% slope

Peak Discharge, Q_{max}=	11.40	cfs
Bottom Width, B =	0.00	ft
Left Side Slope, Z_1 =	3.00	horizontal :1 vertical
Right Side Slope, Z_2 =	3.00	horizontal :1 vertical
Manning's Roughness Coeff., n =	0.030	
Longitudinal Channel Slope, S_o =	0.0300	ft/ft

Depth of Flow Y ft	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R=A/P ft	Average Velocity V ft/s	Discharge (Flow Rate) Q=AV ft^3/s	Avg. Tractive Stress τ_o lb/ft^2	Comments
0.00	0.00	0.01	0.00	0.05	0.00	0.00	
0.25	0.19	1.59	0.12	2.08	0.39	0.22	
0.50	0.75	3.17	0.24	3.30	2.48	0.44	
0.75	1.69	4.75	0.36	4.32	7.31	0.67	
1.00	3.00	6.33	0.47	5.23	15.72	0.89	
1.25	4.69	7.91	0.59	6.07	28.49	1.11	
1.50	6.75	9.49	0.71	6.86	46.31	1.33	
1.75	9.19	11.07	0.83	7.60	69.85	1.55	
2.00	12.00	12.65	0.95	8.31	99.71	1.78	
2.25	15.19	14.23	1.07	8.98	136.49	2.00	
2.50	18.75	15.81	1.19	9.64	180.75	2.22	
2.75	22.69	17.39	1.30	10.27	233.04	2.44	
3.00	27.00	18.97	1.42	10.88	293.89	2.66	
0.88	2.32	5.57	0.42	4.80	11.16	0.78	DESIGN Q

Discharge versus Depth Relationship



Design/Check: Trapezoidal/Triangular Channel

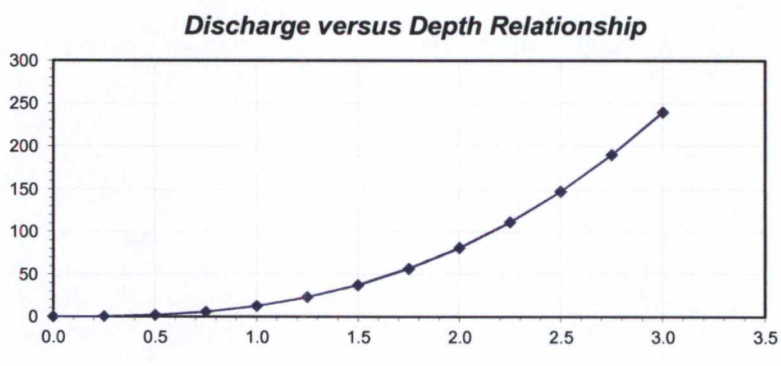
Methodology: Manning's Equation

Project: MIG Dewane landfill

Ditch ID: Typical Bench at 2% slope

Peak Discharge, Q_{max}=	20.00	cfs
Bottom Width, B =	0.00	ft
Left Side Slope, Z_1 =	3.00	horizontal :1 vertical
Right Side Slope, Z_2 =	3.00	horizontal :1 vertical
Manning's Roughness Coeff., n =	0.030	
Longitudinal Channel Slope, S_o =	0.0200	ft/ft

Depth of Flow Y ft	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R=A/P ft	Average Velocity V ft/s	Discharge (Flow Rate) Q=AV ft^3/s	Avg. Tractive Stress τ_o lb/ft^2	Comments
0.00	0.00	0.01	0.00	0.04	0.00	0.00	
0.25	0.19	1.59	0.12	1.70	0.32	0.15	
0.50	0.75	3.17	0.24	2.69	2.03	0.30	
0.75	1.69	4.75	0.36	3.53	5.96	0.44	
1.00	3.00	6.33	0.47	4.27	12.84	0.59	
1.25	4.69	7.91	0.59	4.96	23.26	0.74	
1.50	6.75	9.49	0.71	5.60	37.82	0.89	
1.75	9.19	11.07	0.83	6.20	57.03	1.04	
2.00	12.00	12.65	0.95	6.78	81.41	1.18	
2.25	15.19	14.23	1.07	7.34	111.44	1.33	
2.50	18.75	15.81	1.19	7.87	147.58	1.48	
2.75	22.69	17.39	1.30	8.39	190.28	1.63	
3.00	27.00	18.97	1.42	8.89	239.96	1.78	
1.18	4.18	7.46	0.56	4.77	19.92	0.70	DESIGN Q



Design/Check: Trapezoidal/Triangular Channel

Methodology: Manning's Equation

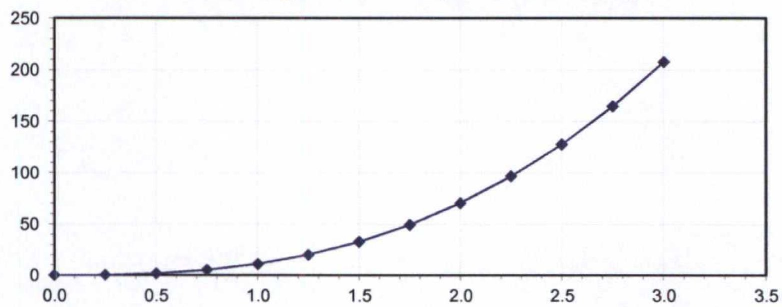
Project: MIG Dewane landfill

Ditch ID: Typical Bench at 1.5% slope

Peak Discharge, Q_{max}=	17.00	cfs
Bottom Width, B =	0.00	ft
Left Side Slope, Z_1 =	3.00	horizontal :1 vertical
Right Side Slope, Z_2 =	3.00	horizontal :1 vertical
Manning's Roughness Coeff., n =	0.030	
Longitudinal Channel Slope, S_o =	0.0150	ft/ft

Depth of Flow Y ft	Area of Flow A ft^2	Wetted Perimeter P ft	Hydraulic Radius R=A/P ft	Average Velocity V ft/s	Discharge (Flow Rate) Q=AV ft^3/s	Avg. Tractive Stress τ_o lb/ft^2	Comments
0.00	0.00	0.01	0.00	0.04	0.00	0.00	
0.25	0.19	1.59	0.12	1.47	0.28	0.11	
0.50	0.75	3.17	0.24	2.33	1.75	0.22	
0.75	1.69	4.75	0.36	3.06	5.17	0.33	
1.00	3.00	6.33	0.47	3.70	11.12	0.44	
1.25	4.69	7.91	0.59	4.29	20.15	0.56	
1.50	6.75	9.49	0.71	4.85	32.75	0.67	
1.75	9.19	11.07	0.83	5.37	49.39	0.78	
2.00	12.00	12.65	0.95	5.87	70.51	0.89	
2.25	15.19	14.23	1.07	6.35	96.51	1.00	
2.50	18.75	15.81	1.19	6.82	127.81	1.11	
2.75	22.69	17.39	1.30	7.26	164.79	1.22	
3.00	27.00	18.97	1.42	7.70	207.81	1.33	
1.18	4.18	7.46	0.56	4.13	17.25	0.52	DESIGN Q

Discharge versus Depth Relationship



ATTACHMENT 7

Conveyance Feature Design Calculations

(Culverts)

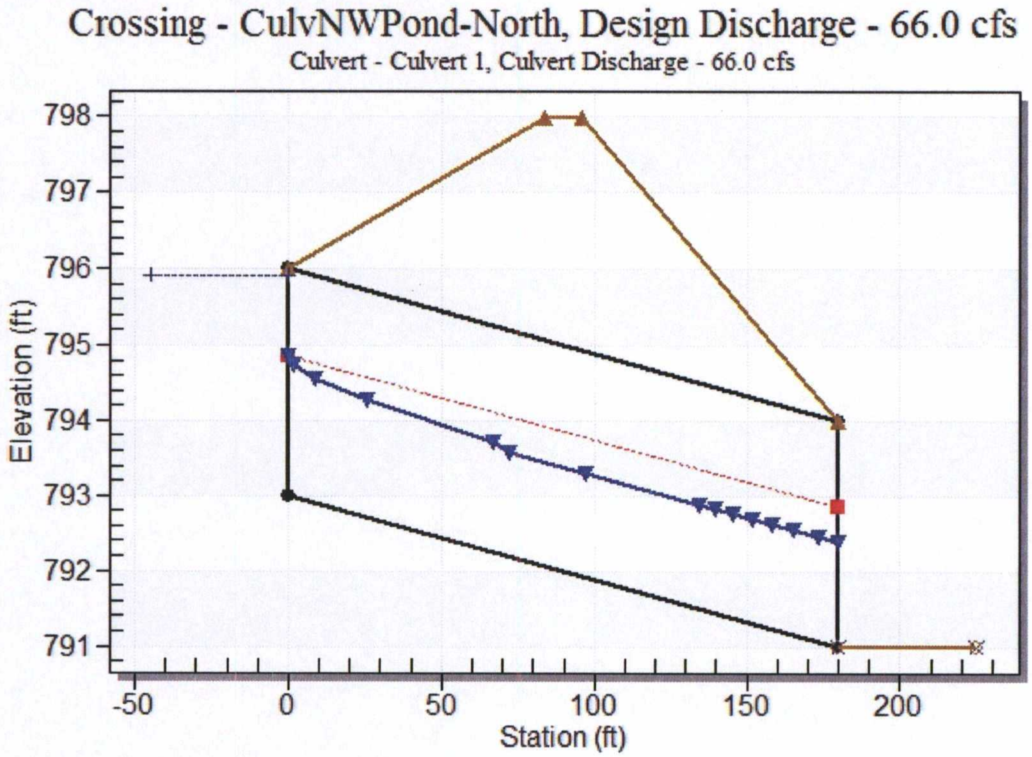
Written by:	ACV	Date:	14 (YY) 04 (MM) 10 (DD)	Reviewed by:	MRB	Date:	14 (YY) 04 (MM) 17 (DD)
Client:	Republic	Project:	MIG / DeWane landfill	Project/Proposal No.:	CHE8214	Task No:	

Table 7-1
Culvert Design Flows and Geometric Data

	Culvert into Pond 1 (Northwest Pond) – north culvert	Culvert into Pond 1 (Northwest Pond) – south culvert	Culvert into Pond 2 (Southwest Pond)	Culvert into Pond 3 (Southeast Pond)
Drainage area (acres)	12.4	5.6	16.6	5.5
100-year peak flow (cfs)	66	41	88	37
Approximate length (ft)	180	170	70	60
Upstream invert elevation (ft)	793	806	791	780.5
Downstream invert elevation (ft)	791	791	790	780
Pipe diameter (inches)	36	36	36	36
Number of barrels	2	1	2	1
Computed upstream headwater elevation (ft)	795.92	809.23	794.78	783.6

HY-8 Culvert Analysis Report

Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 793.00 ft

Outlet Station: 180.00 ft

Outlet Elevation: 791.00 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Mitered to Conform to Slope

Inlet Depression: NONE

Table 1 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	793.00	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
8.00	8.00	793.89	0.886	0.0*	1-S2n	0.442	0.620	0.450	0.000	5.815	0.000
16.00	16.00	794.27	1.269	0.0*	1-S2n	0.648	0.890	0.650	0.000	7.191	0.000
24.00	24.00	794.58	1.581	0.0*	1-S2n	0.793	1.091	0.800	0.000	7.873	0.000
32.00	32.00	794.86	1.862	0.0*	1-S2n	0.929	1.271	0.930	0.000	8.592	0.000
40.00	40.00	795.11	2.112	0.0*	1-S2n	1.041	1.430	1.049	0.000	9.055	0.000
48.00	48.00	795.35	2.351	0.0*	1-S2n	1.152	1.574	1.153	0.000	9.579	0.000
56.00	56.00	795.59	2.593	0.0*	1-S2n	1.255	1.706	1.260	0.000	9.935	0.000
64.00	64.00	795.85	2.849	0.0*	1-S2n	1.351	1.832	1.352	0.000	10.342	0.000
66.00	66.00	795.92	2.916	0.0*	1-S2n	1.376	1.860	1.383	0.000	10.363	0.000
80.00	80.00	796.44	3.436	0.0*	5-S2n	1.542	2.056	1.556	0.000	10.808	0.000

* theoretical depth is impractical. Depth reported is corrected.

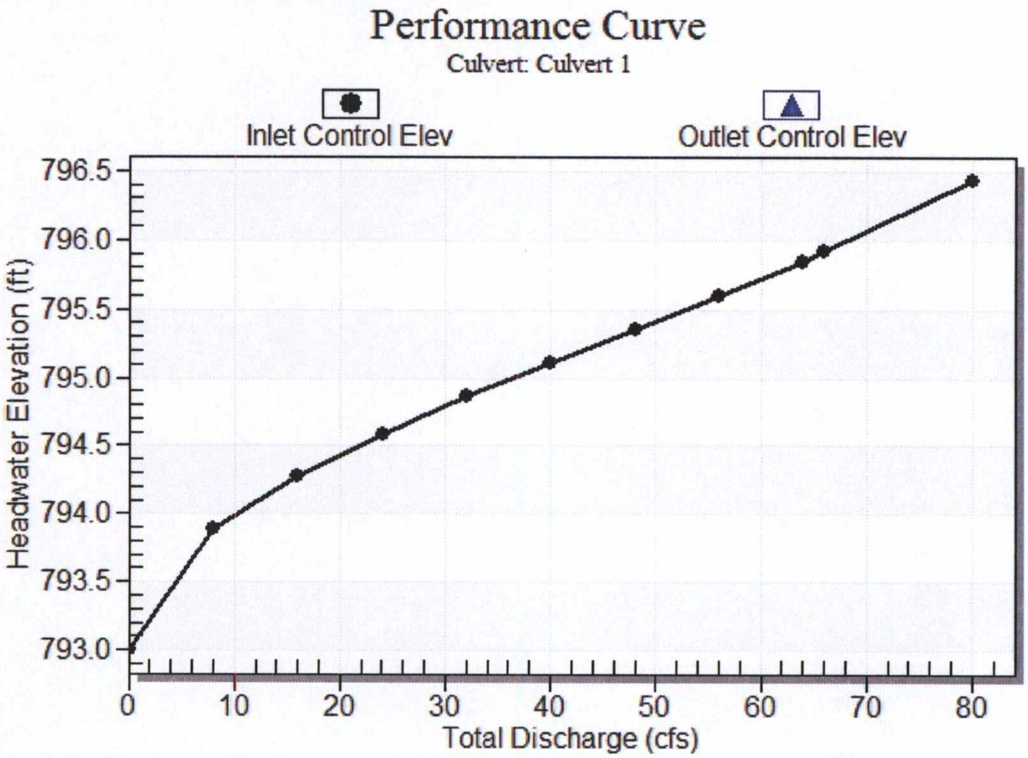
****

Inlet Elevation (invert): 793.00 ft,   Outlet Elevation (invert): 791.00 ft

Culvert Length: 180.01 ft,   Culvert Slope: 0.0111

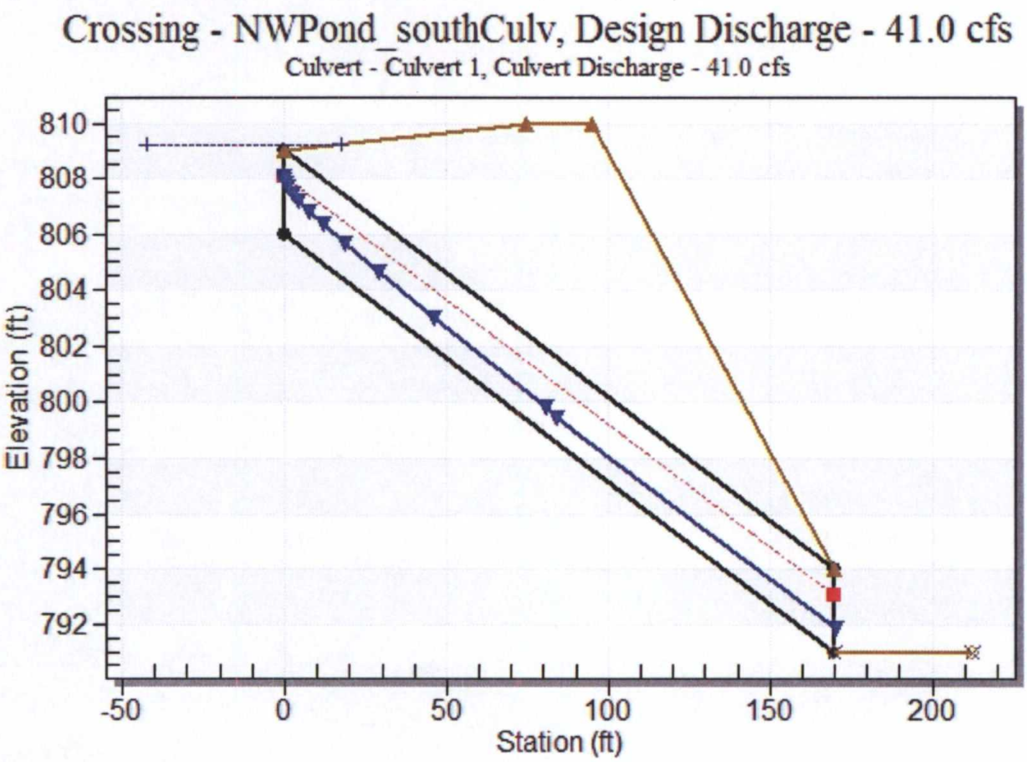
****

Culvert Performance Curve Plot: Culvert 1



HY-8 Culvert Analysis Report

Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 806.00 ft

Outlet Station: 170.00 ft

Outlet Elevation: 791.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Square Edge with Headwall

Inlet Depression: NONE

Table 1 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	806.00	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
5.00	5.00	806.89	0.890	0.0*	1-S2n	0.311	0.688	0.338	0.000	13.810	0.000
10.00	10.00	807.29	1.285	0.0*	1-S2n	0.415	0.992	0.422	0.000	15.951	0.000
15.00	15.00	807.63	1.628	0.0*	1-S2n	0.520	1.232	0.522	0.000	17.862	0.000
20.00	20.00	807.97	1.970	0.0*	1-S2n	0.615	1.430	0.620	0.000	19.069	0.000
25.00	25.00	808.28	2.277	0.0*	1-S2n	0.679	1.607	0.697	0.000	19.884	0.000
30.00	30.00	808.57	2.569	0.0*	1-S2n	0.744	1.772	0.762	0.000	21.031	0.000
35.00	35.00	808.86	2.862	0.0*	1-S2n	0.808	1.916	0.833	0.000	21.737	0.000
40.00	40.00	809.17	3.170	0.0*	5-S2n	0.873	2.056	0.878	0.000	23.175	0.000
41.00	41.00	809.23	3.234	0.0*	5-S2n	0.886	2.084	0.887	0.000	23.437	0.000
50.00	50.00	809.87	3.869	0.0*	5-S2n	0.978	2.293	1.018	0.000	23.581	0.000

* theoretical depth is impractical. Depth reported is corrected.

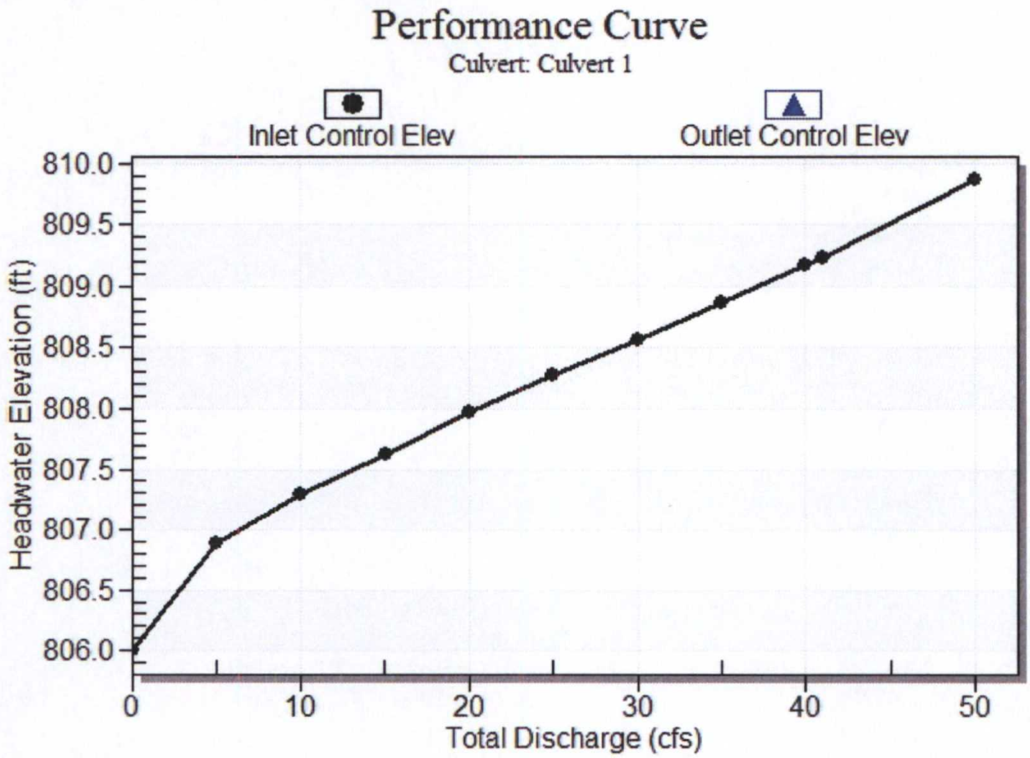
****

Inlet Elevation (invert): 806.00 ft, Outlet Elevation (invert): 791.00 ft

Culvert Length: 170.66 ft, Culvert Slope: 0.0882

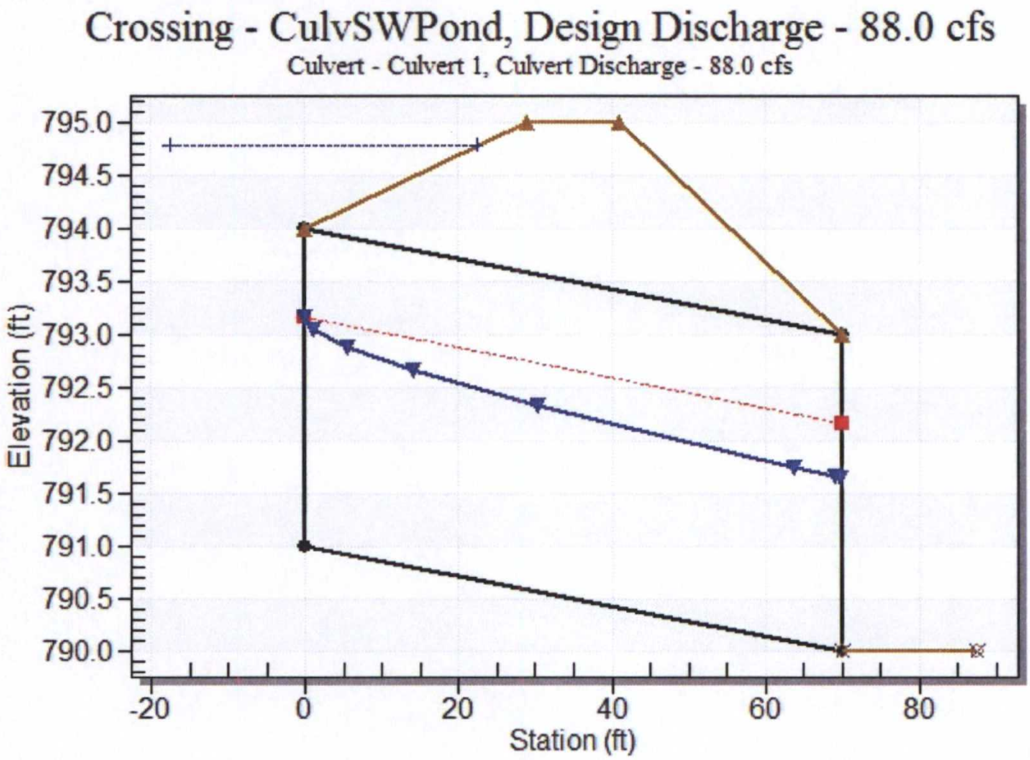
****

Culvert Performance Curve Plot: Culvert 1



HY-8 Culvert Analysis Report

Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 791.00 ft

Outlet Station: 70.00 ft

Outlet Elevation: 790.00 ft

Number of Barrels: 2

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Mitered to Conform to Slope

Inlet Depression: NONE

Table 1 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	791.00	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
10.00	10.00	791.99	0.988	0.0*	1-S2n	0.466	0.688	0.478	0.000	6.701	0.000
20.00	20.00	792.43	1.429	0.0*	1-S2n	0.678	0.992	0.682	0.000	8.210	0.000
30.00	30.00	792.80	1.795	0.0*	1-S2n	0.838	1.232	0.847	0.000	9.113	0.000
40.00	40.00	793.11	2.112	0.0*	1-S2n	0.975	1.430	0.983	0.000	9.904	0.000
50.00	50.00	793.41	2.411	0.0*	1-S2n	1.098	1.607	1.174	0.000	9.744	0.000
60.00	60.00	793.72	2.719	0.0*	1-S2n	1.218	1.772	1.307	0.000	10.136	0.000
70.00	70.00	794.06	3.056	0.0*	5-S2n	1.324	1.916	1.432	0.000	10.504	0.000
80.00	80.00	794.44	3.436	0.0*	5-S2n	1.430	2.056	1.551	0.000	10.852	0.000
88.00	88.00	794.78	3.777	0.0*	5-S2n	1.515	2.155	1.644	0.000	11.098	0.000
100.00	95.16	795.11	4.111	0.0*	5-S2n	1.587	2.237	1.725	0.000	11.312	0.000

* theoretical depth is impractical. Depth reported is corrected.

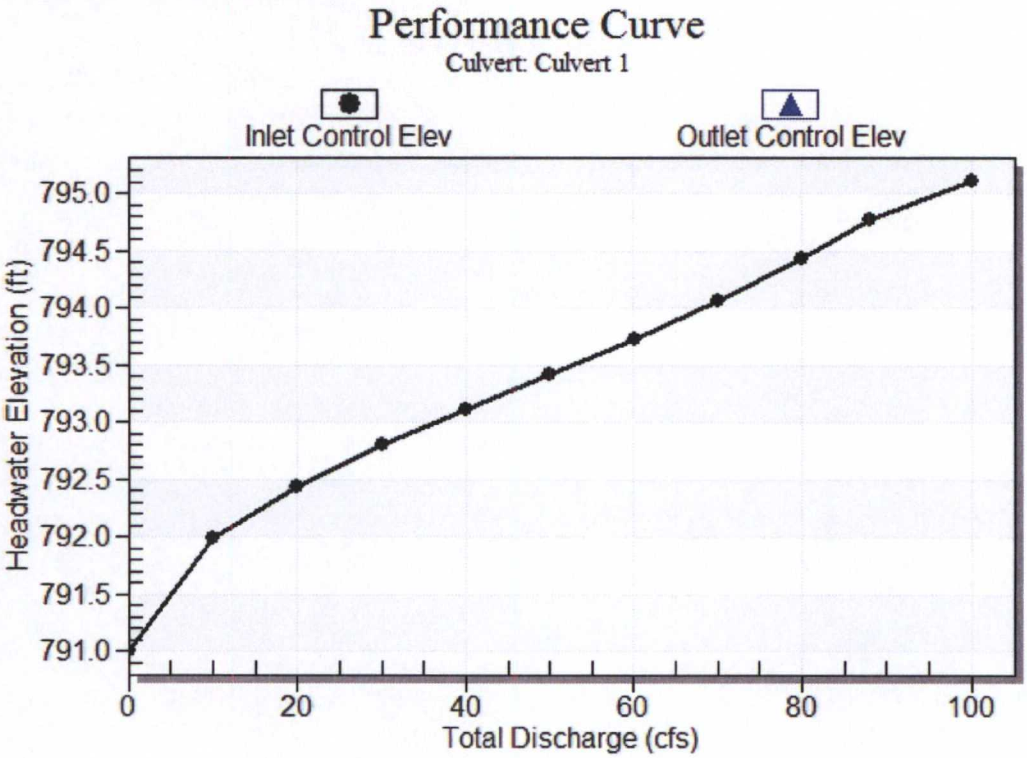
****

Inlet Elevation (invert): 791.00 ft, Outlet Elevation (invert): 790.00 ft

Culvert Length: 70.01 ft, Culvert Slope: 0.0143

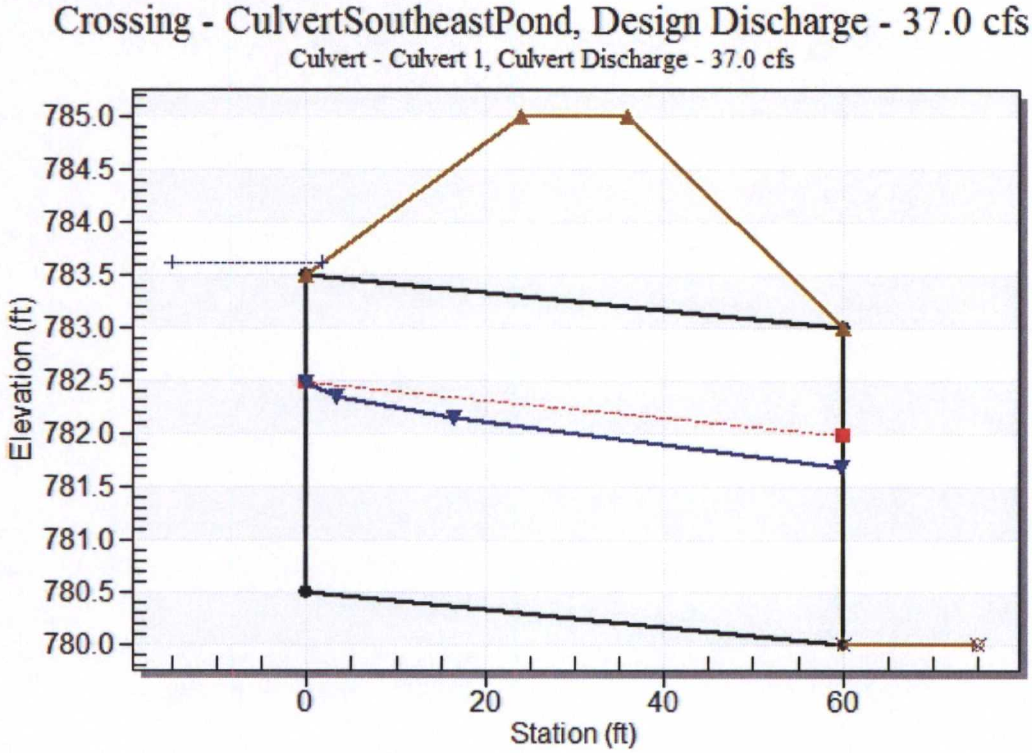
****

Culvert Performance Curve Plot: Culvert 1



HY-8 Culvert Analysis Report

Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 780.50 ft

Outlet Station: 60.00 ft

Outlet Elevation: 780.00 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Square Edge with Headwall

Inlet Depression: NONE

Table 1 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	780.50	0.000	0.0*	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
5.00	5.00	781.45	0.949	0.0*	1-S2n	0.546	0.688	0.548	0.000	5.586	0.000
10.00	10.00	781.87	1.372	0.0*	1-S2n	0.777	0.992	0.782	0.000	6.770	0.000
15.00	15.00	782.25	1.748	0.0*	1-S2n	0.966	1.232	0.974	0.000	7.525	0.000
20.00	20.00	782.59	2.090	0.0*	1-S2n	1.127	1.430	1.172	0.000	7.814	0.000
25.00	25.00	782.90	2.397	0.0*	1-S2n	1.276	1.607	1.331	0.000	8.245	0.000
30.00	30.00	783.19	2.689	0.0*	1-S2n	1.415	1.772	1.480	0.000	8.634	0.000
35.00	35.00	783.48	2.982	0.0*	1-S2n	1.552	1.916	1.623	0.000	8.971	0.000
37.00	37.00	783.60	3.103	0.0*	5-S2n	1.604	1.972	1.672	0.000	9.143	0.000
45.00	45.00	784.12	3.623	0.0*	5-S2n	1.816	2.178	1.894	0.000	9.580	0.000
50.00	50.00	784.49	3.989	0.0*	5-S2n	1.954	2.293	2.025	0.000	9.861	0.000

* theoretical depth is impractical.   Depth reported is corrected.

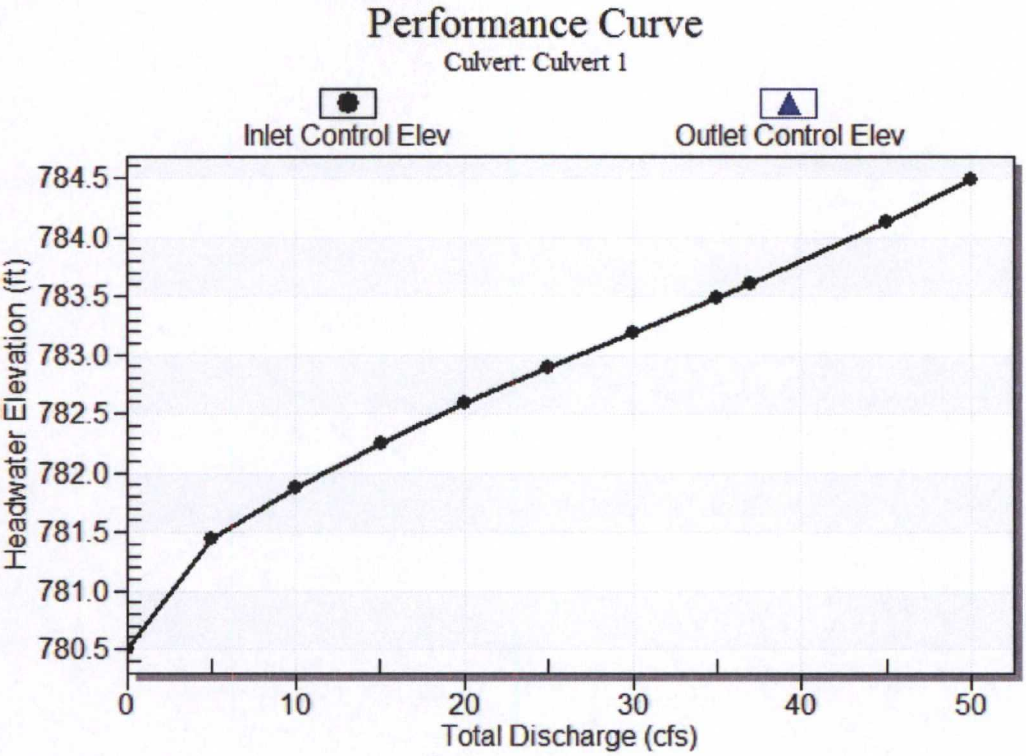
****

Inlet Elevation (invert): 780.50 ft,   Outlet Elevation (invert): 780.00 ft

Culvert Length: 60.00 ft,   Culvert Slope: 0.0083

****

Culvert Performance Curve Plot: Culvert 1

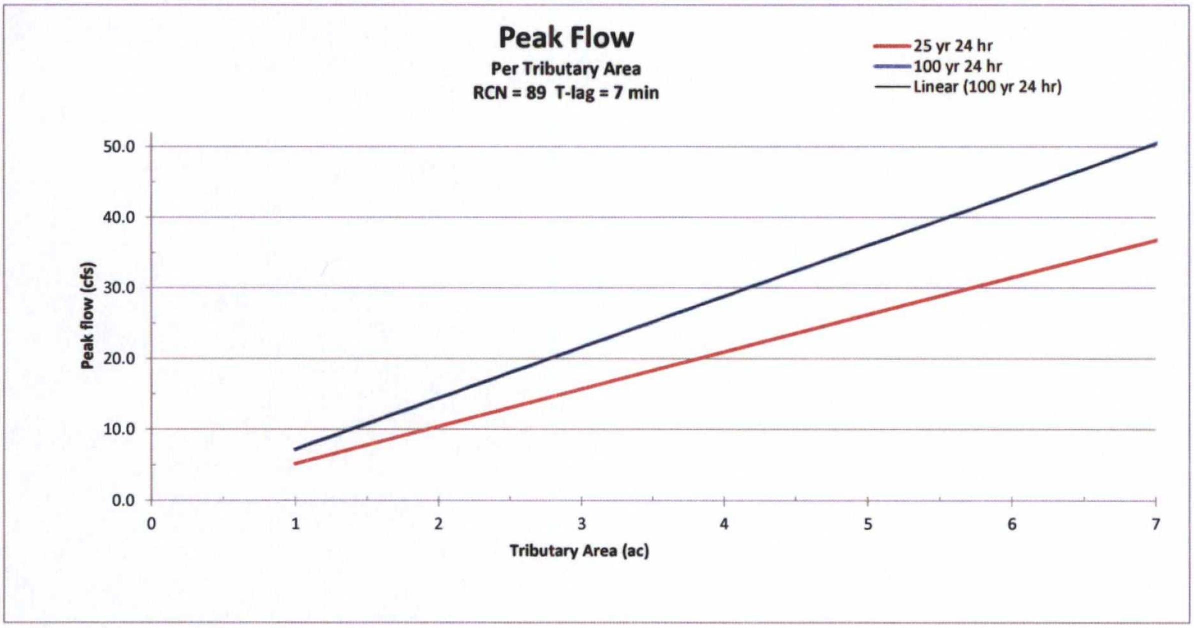


ATTACHMENT 8

Flow vs. Area Rate Curves and Tables

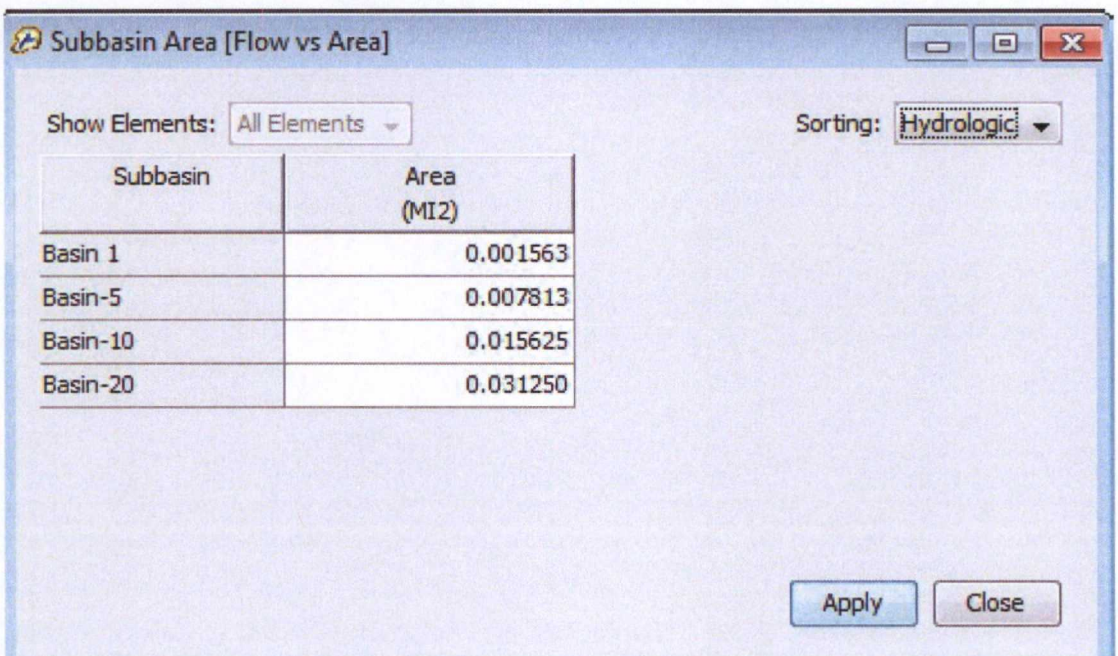
Flow versus drainage area table, curve number = 89, lag time = 7 minutes

	area (sq mi)	area (ac)	25 yr 24 hr	100 yr 24 hr
Basin-1 acre	0.001563	1	5.2	7.2
Basin-5 acres	0.007813	5	26.2	36.0
Basin-10 acres	0.015625	10	52.5	72.0
Basin-20 acres	0.031250	20	104.9	144.0



UNIT AREA FLOWS

HEC-HMS INPUT



Subbasin	Area (MI2)
Basin 1	0.001563
Basin-5	0.007813
Basin-10	0.015625
Basin-20	0.031250

Curve Number Loss [Flow vs Area]

Show Elements: All Elements Sorting: Hydrologic

Subbasin	Initial Abstraction (IN)	Curve Number	Impervious (%)
Basin 1		89	0.0
Basin-5		89	0.0
Basin-10		89	0.0
Basin-20		89	0.0

Apply Close

SCS Transform[Flow vs Area]

Show Elements: All Elements Sorting: Hydrologic

Subbasin	Lag Time (MIN)
Basin 1	7
Basin-5	7
Basin-10	7
Basin-20	7

Apply Close

UNIT AREA FLOWS

HEC-HMS OUTPUT

Global Summary Results for Run "100yr"

Project: UnitPeakQ_MIG Simulation Run: 100yr

Start of Run: 01Jan2011, 00:00 Basin Model: Flow vs Area
End of Run: 05Jan2011, 00:00 Meteorologic Model: 100 yr
Compute Time: 10Apr2014, 16:57:08 Control Specifications: Control 1

Show Elements: All Elements Volume Units: IN AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Basin 1	0.001563	7.2	01Jan2011, 12:00	5.41
Basin-5	0.007813	36.0	01Jan2011, 12:00	5.41
Basin-10	0.015625	72.0	01Jan2011, 12:00	5.41
Basin-20	0.031250	144.0	01Jan2011, 12:00	5.41

(END OF DOCUMENT)

DRAFT

TABLE OF CONTENTS